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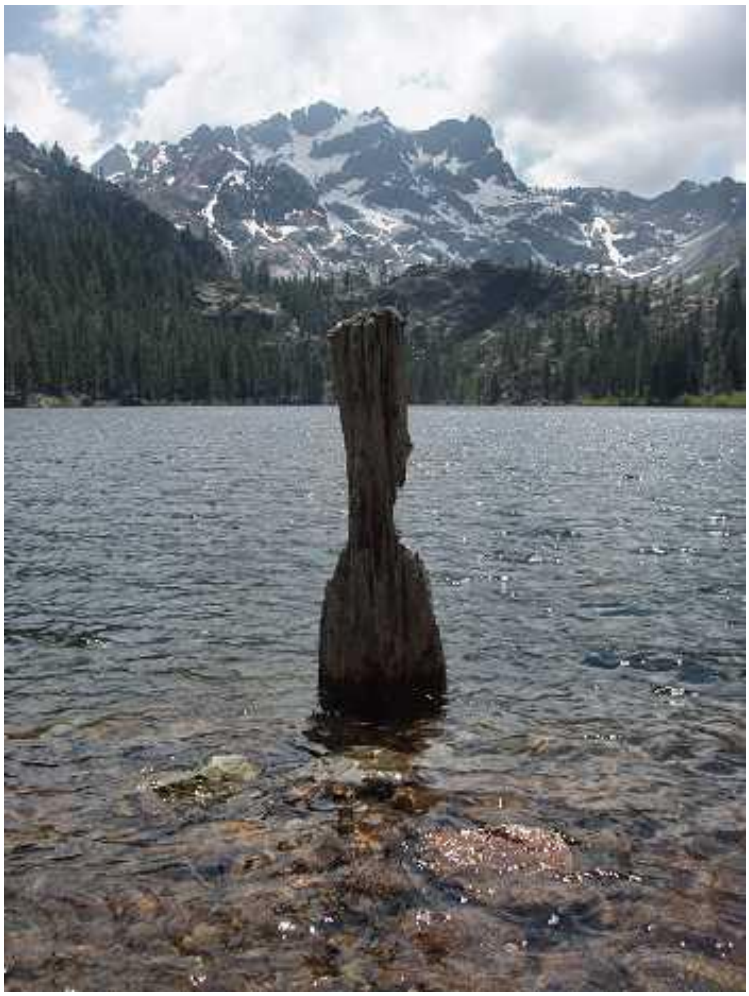
# Environmental Assessment for the Gold Project

## Tahoe National Forest – Yuba River Ranger District



# Gold Project

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# ENVIRONMENTAL ASSESSMENT
**for the**
# Gold Project

**USDA Forest Service – Tahoe National Forest – Yuba River Ranger District**

Project located in Sierra County, California

## Chapter I – Purpose, Need, and Proposed Action

## Introduction

The Forest Service is proposing this project to improve forest health, watershed health, wildlife habitat, and reduce surface fuel loadings and ladder fuels to a level that will allow safe fire suppression in the case of a wildfire, while staying consistent with management direction in the *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Amendment* (2004). The name of the project is the "Gold Project."

Certain conditions currently exist within the project area that can be improved through a strategic, landscape level approach of pro-active vegetative management. These conditions affect the sustainability of a healthy forest, the associated wildlife habitat and the vulnerability of the ecosystem to the effects of large wildfires.

To accomplish these goals, this project proposes the following treatments on approximately 2,100 acres of public lands within the Yuba River Ranger District, north and northeast of the communities of Downieville and Sierra City just west of the Sierra Buttes: (1) Mechanical thinning, including the removal of roadside hazard trees within unit boundaries, (2) Hand thinning of small trees, (3) Hand and mechanical piling and subsequent burning of slash, brush, small conifers and existing debris, (4) Prescribed underburning, (5) Mechanical mastication, (6) Aspen stand restoration, (7) Oak enhancement, (8) Building log structures and cover piles for wildlife, (9) Closing roads that are no longer needed or maintained (approximately 5.1 miles), (10) Reconstructing approximately one mile of existing road to implement activities, (11) Perpetuating bear grass in the project area by removing competing vegetation, and (12) Mechanical site preparation and cluster planting to reforest understocked areas.

## Background

Prior to this project's inception, a watershed assessment was completed for the North Yuba Watershed in 2004. Additionally, an interdisciplinary Fireshed Analysis that included both the North and Middle Yuba River watersheds was accomplished in May of 2004. Both analyses identified areas in need of fuels reduction and stand improvement to reduce the risk of detrimental effects from a major wildfire.

The Fireshed Analysis located portions of the landscape where reducing surface and ladder fuels could reduce extreme fire behavior. This can be accomplished using a variety of management actions such as reducing the density of trees, re-introducing fire using prescribed burns, masticating and removing brush, smaller trees, and understory vegetation.

The two analyses supported the need to improve conditions within specific areas of the two major watersheds by moving their existing condition towards desired conditions in the *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990) as amended by the *Sierra Nevada Forest Plan Amendment* (SNFPA 2004). The Lavezzola and Sierra City sixth-field watersheds were identified as high priority areas on the district, and active management provides numerous opportunities to improve their condition to meet several resource objectives, especially reducing fuels, improving watershed and wildlife habitat, and improving the health of trees within forested stands.

## Purpose and Need

The purpose and need for the Gold Project is to improve forest health, watershed health and wildlife habitat, and to reduce surface fuel loadings and ladder fuels to a level that will allow safe fire suppression in the case of a naturally occurring fire, consistent with management direction in *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Amendment* (2004).

The Gold project area is located north of Hwy 49 and the North Yuba River, west of Gold Lake Hwy, east of Downieville and south of Gold Lake, at elevations ranging from 3,200 to 7,400 feet. Annual precipitation averages 60 to 70 inches, most of this falling as snow. Forest stand characteristics vary by elevation and aspect within the project area. In the western portion of the project area, stands are primarily of the mixed conifer series group (USDA 1993). The mixed conifer series grades into the white fir series (USDA 1993) as elevation increases. At the highest elevations, mostly in the northeastern and eastern portions of the project area, the vegetation changes to the red fir series (Fites 1997), including red fir, red fir – mixed conifer, and red fir – white fir types. Generally, the southerly facing aspects have higher amounts of pine and oak, especially in the mixed conifer type, and the more northerly facing slopes have higher amounts of true fir.

Over the past 20 years, vegetation treatments within the project area have included commercial timber harvesting, plantation management including release and precommercial thinning, harvesting of Christmas trees, pile burning, and hazard tree removal. Past projects

were designed to accomplish a wide variety of resource objectives and were implemented under the guidance of numerous environmental documents.

An analysis of the recorded fire history for the project area and its immediate surroundings indicate that fire continues to influence the landscape. The data from which the following tables are derived is the recorded fire history for the project area of the Tahoe National Forest from 1909 to 2009. It is understood that this data does not contain all of the fires that actually occurred, due to numerous reasons (lack of reporting, differing priorities over the decades, loss of records, etc.). There is however, enough data to demonstrate the continuing influence of wildland fire in the project area.

**Fires greater than 100 acres adjacent to Project Area, 1909 – 2006**

| Year | Cause | Total Fire Size (acres) |
|---|---|---|
| **1909** | Unknown | 140 |
| **1910** | Human | 773 |
| **1924** | Human | 4068 |
| **1926** | Human | 409 |
| **1932** | Human | 300 |
| **1934** | Human | 246 |
| **1940** | Human | 101 |
| **1949** | Human | 100 |
| **1960** | Human | 131 |
| **1978** | Lightning | 1786 |
| **1990** | Unknown | 241 |
| **2006** | Human | 2097 |

**Fires greater than 10 acres within Project Area, 1909-1960**

| Year | Cause | Total Fire Size (acres) | Acres Burned in the Project Area |
|---|---|---|---|
| **1909** | Human | 173 | 173 |
| **1916** | Human | 699 | 307 |
| **1921** | Human | 86 | 42 |
| **1941** | Human | 12 | 12 |
| **1953** | Human | 84 | 84 |
| **1954** | Human | 2300 | 208 |
| **1959** | Human | 10 | 10 |
| **1960** | Lightning | 1321 | 1321 |

These data indicate that between 1909 and 1960, a little more than 2,157 acres within the project area have been affected by wildland fire. This constitutes 13% of the total acreage analyzed.

Wildland fire is, and will continue to be, a major influence on the vegetation and condition of the area.

Certain conditions currently exist within the project area, partially as a result of the actions and events mentioned above, that can be improved through a strategic, landscape level approach of pro-active vegetative management. These conditions affect the sustainability of a healthy forest, the associated wildlife habitat and the vulnerability of the ecosystem to the effects of large wildfires.

**1. Action is needed to develop more complex, diverse forest structure, both at a stand scale and landscape scale.**

As a cumulative result of past grazing practices, harvesting practices, aggressive wildfire suppression and warmer and wetter conditions within the last century (compared to previous centuries), an oversimplified forest structure exists. Active wildfire suppression has lead to an unnatural buildup of surface fuels and overcrowding of trees. Historically, fires burned irregularly, leaving trees of various ages and sizes, removing competing understory vegetation, naturally thinning trees, creating openings, and recruiting dead wood in the form of snags and large logs. As a result, natural fires created within-stand diversity, as well as increased diversity across the landscape. Currently, forest structure generally lacks these characteristics. Also lacking are multi-layered tree canopies on lower and north-facing slopes, and at the lower elevations, more open pine-oak dominated stands on ridgetops and south-facing slopes.

**2. Action is needed to improve the health and vigor of forest stands.**

There are numerous overly dense stands within the project area that are not conducive to the long-term growth or maintenance of healthy trees. In addition, in the Sierra Nevada, projections are for a warming of about 3 degrees (C) during the 21$^{st}$ century (Hettinger et al. 2004, pp. 43-46). Predictions also include changes in the timing and amount of precipitation including spring runoff. Increased temperatures and drier conditions will affect the amount and types of vegetation that will grow in a particular area. Trees growing very closely together compete for soil nutrients and water and become weakened. This puts them at risk to insect infestation, pathogens, and drought impacts. In healthy forests, patchy tree mortality creates within-stand diversity and decreases stand density, both desirable characteristics. However, when landscapes containing dense stands of trees experience sustained drought, epidemic insect infestations create extensive areas of tree mortality and fuels accumulation. This is not desirable, especially where goals include reducing the likelihood of a stand replacing wildfire.

Diseases such as *Cytospora* canker in red fir and white pine blister rust in sugar pine are prevalent throughout the project area. Additionally, *H. annosum* or annosus root disease has been observed within the project area, and it is likely affecting the health and vigor of true fir in many of the stands. Increased amounts of dead and/or defective trees can create unsafe conditions for forest users including motorists, mountain bikers, equestrians, and hikers.

In addition to natural stands, approximately 42 acres of young conifer plantations in the project area are overcrowded with trees. These conditions reduce the growth and health of the trees and predispose plantations to epidemic levels of insect infestation.

**3. Action is needed to improve the quality and quantity of native shrubs and oaks in the project area.**

Currently, the project area and landscape do not contain the desired quality and quantity of native shrubs. Field observations show that existing shrub patches are over-mature and decadent. Much of the palatable browse is out of reach to browsing animals, and is less nutritious than forage produced by younger shrubs with more vigorous growth. Additionally, the lack of openings in forested stands and greater quantities of duff and litter on the forest floor hinder oak seedling establishment. High numbers of conifers are shading out oaks and suppressing their crown development, reducing acorn production for wildlife. This poorer quality forage limits wildlife populations across the landscape. Declines in forage quantity and quality are projected to continue without active management.

**4. Action is needed to improve conifer tree species diversity in the project area.**

Localized tree mortality has created areas that are understocked with trees. Some of these areas have dense shrub regeneration, reducing tree growth. Other areas have little vegetation present, and very little natural seeding is occurring because seed sources are not currently present due to previous salvage and sanitation harvest activities. What little natural regeneration exists is made up primarily of true fir. Given current climate change projections, these elevations would likely be more suitable to other species, such as pines, Douglas fir, and incense cedar.

**5. Action is needed to reduce fuel loading in areas of dense, smaller trees and thick undergrowth.**

Areas of dense smaller trees and thick undergrowth exist primarily in isolated areas throughout the project area. These areas contain a high level of contiguous surface fuels, creating conditions for more intense fires, including a higher incidence of crown fire, higher mortality of vegetation, and greater impacts on soil and water resources.

This area of the Tahoe National Forest has a history of large, stand replacing wildfires that have occurred, including the Tunnel No. 6 Fire in 1965 and the Bassetts Fire in 2006. The effects of these fires include loss of structures, critical habitat for threatened and endangered species, timber, plantations and damage to soils, watershed and recreational values. The financial costs of suppression, emergency rehabilitation and restoration of these fires have been high.

**6. Action is needed to restore declining aspen stands in the project area.**

Aspen stands within the Gold project area are rapidly declining in numbers and size. The majority of aspen stands in the north-side of the Yuba River Ranger District (including aspen stands within the Gold project area) have been inventoried and ranked for their risk of long-term survival. This inventory indicates that over 75 percent of inventoried aspen stands are at a moderate to high risk of being lost because of shading from conifer over-stories and poor

regeneration. Several remnant patches of aspens (see acres in Table 3) are present within and around Butcher Ranch meadow. Inventories rank these aspens at a high to highest risk of loss because of shading from conifers, insufficient re-sprouting, and little multi-aged structure to ensure for replacement trees.

## Proposed Action

The proposed action is designed to modify landscape-scale fire behavior by implementing management direction for strategically placed area treatments described in 2004 SNFPA ROD Standard and Guidelines #1 and #2 (pg 49). As such, treatment areas were located and treatment prescriptions were developed by evaluating topography, ownership patterns, potential fire behavior, existing vegetative and wildlife habitat conditions, historic recreational use and the location of the wildland urban interface (WUI). Areas were prioritized for treatment based on their stand characteristics, expected effectiveness of treatments, economical considerations, proximity to other treatment areas and their fit into the overall landscape strategy. For this reason, not all areas within the project area are proposed for treatment. The goal was to initiate vegetative treatments in specific locations where the effects of the activities would reduce potential wildfire intensity, improve overall tree health, improve within stand structural diversity, and enhance wildlife habitat across a broader landscape.

Generally, hand thinning and mastication would remove smaller trees up to 10 inches in diameter while mechanical thinning would remove selected conifers up to 29 inches in diameter. The actual boundaries where treatments are being proposed are located along strategic landscape features such as existing roads, ridge tops and areas where there are dramatic changes in fuel types and natural topographical elements.

Fuels treatments have been planned along main travel corridors and ridges to compliment strategic control points in the event of a wildfire. Prescribed burn units have been designed to use existing road systems to alleviate the need for ground disturbing control lines. Fuels treatments follow Agee's four basic principles of effective fuels reduction: reduction of surface fuels, increase in crown base heights, decrease in crown density and retention of large fire-resistant trees (Agee and Skinner, 2005).

The proposed action includes the following treatments: (1) Mechanical thinning, including the removal of roadside hazard trees within unit boundaries, (2) Hand thinning of small trees, (3) Hand and mechanical piling and subsequent burning of slash, brush, small conifers and existing debris, (4) Prescribed underburning, (5) Mechanical mastication, (6) Aspen stand restoration, (7) Oak enhancement, (8) Borate compound application to freshly cut stumps greater than 14" diameter around selected high value trees, in recreational areas, and in stands of healthy true fir, (9) Clearing high concentrations of woody debris from around selected large trees (> 30" dbh) in preparation for prescribed burning, (10) Building log structures and cover piles for wildlife, (11) Closing roads that are no longer needed or maintained (approximately 5.1 miles), (12) Reconstructing approximately one mile of existing road to implement activities, (13) Perpetuating bear grass in the project area by

removing competing vegetation, and (14) Mechanical site preparation and cluster planting to reforest understocked areas.

A description of each type of proposed treatment is listed below:

**Mechanical Thinning** – Mechanical thinning is a harvest activity that utilizes ground-based or aerial logging equipment to remove identified trees while retaining desirable trees in order to accomplish fuels reduction, stand improvement, public safety and/or wildlife habitat enhancement objectives. A network of skid trails, landings, and, in some cases, temporary roads (which are removed following project activities) is used to transport and collect harvested material.

**Underburning** – Underburning is a generalized term used when applying prescribed fire to large areas. Prescribed fire targets surface fuels, some understory, and, in rare cases, larger trees. Surface fuels are the primary agent of fire spread. The objective is to apply controlled fire under optimum conditions where the treatment can modify fuel conditions to effectively reduce fire behavior and the corresponding intensity of a future wildfire. Within some areas proposed for burning, the goal of the treatment may be to consume a significant portion of the understory vegetation in order to reduce future fire severity. In other areas, the goal is to create new growth of native shrub species and forage opportunities for wildlife.

**Hand or Tractor piling, and burning** – After small conifers (generally less than 10 inches dbh) and brush (generally greater than 12 inches in height) have been hand cut, the material would be piled by a tractor or by hand into burn piles and covered with material to keep dry. The piles are subsequently burned in the winter months or during periods of low fire danger. This treatment removes ladder and surface fuels throughout the treatment unit.

**Mechanical Mastication** – A masticator is a low ground pressure piece of equipment that "chews" up brush, small understory trees and downed woody fuels. Mastication does not actually remove any wildland fuels from the treated area, but changes the size, continuity, and arrangement of the fuels, producing a change in fire behavior.

**Hand Thinning** – Hand thinning is an activity that utilizes crews with chainsaws or handsaws that cut understory conifers less than 10 inches in diameter and brush (greater than 12 inches in height) in order to accomplish stand improvement and/or wildlife habitat/plant community enhancement objectives.

**Site Prep and Cluster Planting** – Site preparation followed by cluster planting would reforest understocked areas with a diverse mixture of conifer species, thus making forested stands more resilient, especially with predicted changes in climatic conditions.

Specifically, the following actions are being proposed:

- Mechanical Thinning to Meet Multiple Resource Objectives: Approximately 940 acres are proposed for thinning within the treatment units identified in Table 1-2 and displayed on the maps in Appendix A. Thin natural stands primarily to create a more

diverse stand structure containing clumps and small openings (up to 1/4 acre in size) and to improve overall tree health and resistance to insects and disease.

Thinning would remove trees throughout the available size classes (as specified in Chapter III, Table 3-3); however, overall many more small trees would be removed than larger trees. Methods would include a mixture of thinning from below to improve spacing between crowns, creation of ¼ acre gaps, and selective tree removal, encouraging uneven- sized structure. All trees 30 inches dbh or larger would be retained (SNFPA 2004) outside proposed aspen stands. Canopy cover would not be reduced below 40 percent in any proposed thinning stand. Trees encroaching on healthy black oak would be removed to increase the amount of sunlight reaching the oak crowns. Areas of diverse stand structure valuable to wildlife would be protected from harvest operations. Thinning prescriptions would strive to retain the most fire and drought tolerant trees while maintaining a mixture of species naturally occurring in the area. All thinning treatments are consistent with the SNFPA ROD standards and guidelines for mechanical thinning treatments (pp. 50-51).

- Oak Enhancement: Oak enhancement treatments would be conducted within five of the proposed thinning units. Cut smaller diameter conifers less than 10 inches dbh from beneath and around oaks in units 3, 2, 1, 4, and 11 (in that order of priority, determined by the predominance of oak occuring in the stand). Conifers would be selected to reduce competition, or those that could shade out oaks over time.

- Aspen Restoration: Aspen restoration is proposed on approximately 22 acres and treatment locations are shown on the attached map. To ensure for maximum sun exposure to aspen roots while balancing protection to adjacent conifer stands, the maximum treatment area would be identified as a distance surrounding the aspen stand (or where living aspen trees or sprouts are present): 1.5 tree heights on the east and west sides of the aspen stand, 2 tree heights from the south side of the aspen stand, and 1 tree height on the north side.

  To address potential concerns regarding the retention of large or legacy structure, the following guidelines will apply for all aspen treatment units:

  > Retain all existing legacy conifers (those showing Old Growth attributes). Legacy trees will be identified, using general guidelines available in: *A Tree Classification for the Selection Forests of the Sierra Nevada* (Duncan Dunning 1928), *Growth Classification Systems for Red Fir and White Fir in Northern California* (George T. Ferrell 1983), and personal communication with an ecologist (JoAnn Fites 2009).
  >
  > If legacy trees are not present, for all aspen stands that exceed 5 acres in area, retain up to two trees per acre of the largest trees equal to or greater than 30 inches dbh.

Where it does not compromise safety, protect existing snags equal to or greater than 20 inches dbh and 15 feet high.

Remove smaller diameter (less than 10" dbh) conifers within identified aspen stands as follows: Cut small diameter conifers from within and around aspens. All slash disposal activities would be coordinated with a biologist, to protect the aspen stand and riparian vegetation. In addition, as specified by the district fuels specialist in coordination with the district silviculturist and wildlife biologist, cut material within the aspen stand would be: (1) used to create cover piles or log structures for small mammals, (2) strategically scattered throughout the aspen stand (generally not to exceed 50 percent of the ground surface) to discourage browsing on aspen shoots that have terminal leaders that are less than 7 feet tall, and (3) excess slash will be piled by hand outside of the aspen stand and riparian vegetation and burned. Avoid creating cover piles along roads. Cover piles would not exceed 10 per acre, unless otherwise coordinated with a fuels specialist and either the district silviculturist or wildlife biologist, to avoid concerns over accumulation of fuels or suppression to aspen regeneration.

Remove larger diameter (>10"dbh) conifers within identified aspen stands as follows: Where commercial opportunities are utilized, whole-tree yard conifers 10 inches dbh and greater wherever practical, using helicopter methods. Where whole tree yarding is not practical, all slash disposal activities would be coordinated with a biologist, to protect the aspen stand and riparian vegetation. Slash disposal activities may include lop and scatter or hand cut and pile and would be coordinated with a fuels specialist, hydrologist, and a biologist on a site specific basis.

Where commercial opportunities are not available or where conifer removal within the identified aspen stands may not occur because of localized resource concerns, conifers may be reduced by the following methods: (1) fell and retain on the ground as dead wood, or (2) girdle a proportion of existing trees to create snags. To protect resource concerns, all trees identified for felling or girdling will be coordinated among resource specialists in the following areas: fuels, wildlife, silviculture, hydrology, archaeology, and botany.

- Hand Thin and Tractor Pile to Reduce Surface and Small Ladder Fuels: Hand thinning and tractor piling would be used on approximately 621 acres in both mechanically thinned and unthinned stands on slopes of generally 25 percent or less, as shown on the maps in Appendix A. Hand thinning and tractor piling would be used to reduce activity generated and natural fuels that exceeded the loading that could be underburned safely. Fuels would be piled by tractor into piles of 5-10 tons, lined and then burned the following winter. Concentrating fuels into burn piles allows for safer conditions of fuel removal by firefighters because the complexity of the burns are less, and therefore give a broader range of times to accomplish, as well as reduces smoke impacts on the environment. Hand thinning of conifers less than 10 inches dbh to approximately 20 foot spacing and cutting of brush (greater than 12 inches in height) would be followed by tractor piling and pile burning. Hand thinning and

tractor piling would occur within stands that are dominated by true fir because true fir is susceptible to injury from fire due to thin bark, low, flammable crowns and unprotected buds (Sugihara et al, 2006). Thin and tractor pile and burn all regeneration, brush and slash.

- Hand Thin and Hand Pile to Reduce Surface Fuels: Hand thinning and hand piling would be conducted on approximately 65 acres in unthinned stands that are generally greater than 25 percent slope, as shown on the maps in Appendix A. This treatment would be conducted on steeper slopes where natural fuels exceeded the fuel loading that can be safely underburned. Fuels would be piled into piles of 3-5 tons, lined and then burned in the following winter. The concentration of the fuels into piles allows for safer conditions of fuel removal by firefighters because the complexity of the burns are less, and therefore give a broader range of times to accomplish, as well as reduces smoke impacts on the environment.

- Underburning to Reduce Surface Fuels: Approximately 130 acres of mechanically thinned units and approximately 543 acres of unthinned stands would be underburned, (Refer to the maps in Appendix A.) The intention of this treatment is to reduce the surface fuel loading in these stands to levels that, when exposed to wildfire, will burn with lower fire line intensities and rates of fire spread. This change to the current fire behavior will allow for safer suppression of wildfires, reduce large stand-replacing wildfires, and cause less ecological injury.

- Mastication to Reduce Fuel Loading: Mastication, proposed on approximately 67 acres as shown on the maps in Appendix A, would be used to chip or shred the standing brush and small trees and spread the broken material across the ground to prevent the sprouting of unwanted vegetation. This action breaks the ladder between the surface and aerial fuels, thus reducing the potential for crown fire.

- Log Structures and Cover Piles: Improve cover for smaller animals and prey species, where cover and/or large log structures are lacking, by cutting slash and smaller diameter trees (less than 10 inches diameter) and re-arranging them to create cover piles and log structures, within treated units. Priority areas would be near riparian areas and within sensitive wildlife species habitat. Cover piles would not be placed in areas of sensitive plants. Cover piles are proposed within approximately 10 percent of the area within proposed units. In general, cover piles will not exceed an average of 10 per acre. The district biologist would coordinate with the district fuels specialist to locate these log structures and cover piles to avoid site-specific fuels concerns at the time of project implementation.

- Large Tree Protection: Remove heavy accumulations of duff and down material from around the boles of selected large trees greater than 30 inches dbh for added protection before underburning.

- Borate compound application: Around individual high value trees, in recreational areas, or in stands of healthy true fir, treat freshly cut stumps greater than 14”

diameter with a registered borate compound to minimize the creation of new root disease infection centers.

- Precommercial Thinning to Improve Health of Plantations: Thin existing plantations using chainsaws. The target stocking level following thinning would be a range from 180 to 360 trees per acre depending on species composition. Tree species other than true fir would be favored in leave tree selection to increase species diversity. No oaks would be cut. Trees and limbs would be cut to lengths of 4 feet or less and slash depth would be reduced to approximately 18 inches by lopping and scattering of cut material. Slash created within 50 feet of National Forest System roads and county roads would be pulled to the road and chipped. The chips would be spread back on the site with an average depth of less than 3 inches and no area having chips more than 6 inches deep.

- Site Preparation and Cluster Planting to Reforest Understocked Areas: Approximately 60 acres are proposed for site preparation and cluster planting as shown in Table 1-3 and displayed on the maps in Appendix A. These sites would be mechanically prepared for planting by excavator piling of shrubs and down fuels concentrations. Woody shrubs would be pulled rather than pushed to remove. Maintain average 60 percent effective ground cover. Burn piles in the fall. Plant seedlings in clusters of 3 trees at an average of 25 foot spacing with the 3 trees planted 4 to 6 feet from each other. Planting would preferably occur in the fall although spring planting would be done if fall conditions were not optimum. Plant a mixture of ponderosa pine/Jeffrey pine, Douglas-fir, incense-cedar, and sugar pine on the site. True fir would be expected to seed in naturally. Seedlings would be planted with a control release fertilizer packet to help the seedlings compete with other vegetation. A technique called "bootstrapping" would be used where approximately one half cup (4 ounces by volume) of soil from a nearby forested site would be placed in the hole with the seedling. Bootstrapping is used to inoculate the soil with fungi called mycorrhizae that have a mutually beneficial relationship with plant roots. The seedlings would have a 5 foot radius grubbed 2 to 3 summers following planting.

- Cluster Planting without Site Preparation: On areas that do not have enough shrub cover or fuels concentrations to warrant piling (approximately 73 acres, as shown in Table 1-3 and displayed on the maps in Appendix A), plant a mixture of ponderosa pine/ Jeffrey pine, Douglas-fir, incense-cedar, and sugar pine on the site. Planting would occur in cluster of three trees per cluster with the clusters spaced an average of 25 feet apart. Within the clusters, trees would be planted 4 to 6 feet from each other. Planting would preferably occur in the fall although spring planting would be done if fall conditions were not optimum. True fir would be expected to seed in naturally. Seedlings would be planted with a control release fertilizer packet to help the seedlings compete with other vegetation. A technique called "bootstrapping" would be used where approximately one half cup (4 ounces by volume) of soil from a nearby forested site would be placed in the hole with the seedling. The soil would be collected from the thinning units. The seedlings would have a minimum 5 foot radius

grubbed the summer following planting. One more manual release treatment may be performed if necessary.

- Road Reconstruction: Harvest activities would require approximately one mile of road reconstruction.

- Forest Products: Through Forest Service contracts, offer sawtimber, and biomass material for removal.

- Bear Grass Enhancement/Regeneration: Hand cut less than ¼ acre in total of the shrubs in the bear grass area in Section 19, northwest of New York Ravine, and west of Unit 10, and pile the shrubs outside the bear grass patch.

- Removing Hazards Created by Danger Trees: Per district hazard tree guidelines (available upon request, at Yuba River RD), identify and remove hazardous trees along maintenance level 3, 4, and 5 National Forest System roads and high-use recreational/administrative sites. In either case, hazardous trees would be removed within thinning unit boundaries only.

- Road Maintenance: Maintain some National Forest System roads to provide access to treatment areas, provide for public and contractor safety, and improve watershed conditions through erosion control and road surface protection (see chart below).

- Road Closing/Decommissioning: Based on 40 CFR 1502.2 and 1506.1, this proposal avoids actions that would limit the choice of alternatives in the Tahoe National Forest's ongoing travel management planning effort. A final decision on travel management is expected before a decision on this proposal. The decision on road management under this project would be consistent with the Forest's travel management decision.

    - Close/decommission approximately 5.1 miles of roads (refer to the following list):

| Gold Project Road Management Proposed Actions | | | | | |
|---|---|---|---|---|---|
| **Road ID** | **Name** | **ML** | **Length (mi)** | **Action** | **Remarks** |
| **93 (seg I)** | Gold Valley | 5 | 3.5 | Prehaul Maintenance | 11 mi of haul/use high vis signs as needed |
| **93 (seg II)** | Gold Valley | 3 | 9.6 | Prehaul Maintenance | See above |
| **93-1** | Deer Lake | 2 | 1.4 | Prehaul Maintenance | 1 mi of haul/use high vis signs as needed |
| **93-2 (seg I)** | Monarch | 3 | 1.8 | Prehaul Maintenance | 2 mi of haul/use high vis signs as needed |
| **93-2 (seg II)** | Monarch | 2 | 3.4 | Proj. prop/prehaul Maintenance | See above |
| **93-2-1** | Monarch Spur | 1 | 1.0 | Purch close/prehaul Maintenance | ½ mi h of haul/purch earth berm |
| **93-2-1** | Unauthorized road to east | | .5 | Decommission | East of 2nd intersection |
| **93-2-2** | Monarch Spur | 2 | .9 | NA | NA |
| **93-3** | Pauley Creek | 3 | 4.3 | Prehaul Maintenance | ½ mi of haul/use high vis signs as needed |
| **93-3-1** | Pauley Creek Spur | 1 | .5 | Prehaul Maintenance | 1 mi haul/need easment |
| **93-3-1** | Pauley Creek Spur | 1 | .2 | Decommission | Obliterate sec to south |
| **93-3-4** | Pauley Creek Spur | 1 | .5 | Decommission | Obliterate (Possible WIN) |
| **93-3-5** | Pauley Creek Spur | 1 | .4 | Decommission | Obliterate (Possible WIN) |
| **93-4 (seg I)** | Hog Canyon | 3 | 3.3 | Prehaul Maintenance | 4 mi haul |
| **93-4 (segII)** | Hog Canyon | 2 | 1.4 | Prehaul Maintenance | See above |
| **93-4-1** | Hog Canyon Spur | 2 | .7 | Prehaul Maintenance | NA |
| **93-5** | Gold Valley Spur | 1 | .3 | Decommission | Temp/obliterate |
| **93-6** | Tillack | 1 | .7 | Improve | Possible (WIN) project |
| **93-7** | New York Ravine | 2 | 2.4 | Reconstruction* | *1 mile reconstruction (brush east portion) |
| **93-7-2** | New York Ravine Spur | 1 | .4 | Decommission | Obliterate |
| **93-7-4** | New York Ravine Spur | 1 | .3 | Decommission | Possible (WIN) project |
| **93-11** | Shaughnessy | 1 | 2.0 | Prehaul Maintenance | 1st 2 miles were reconst., but already completed by SPI |
| **Unauthorized Road** | Gold Point Mine Road (north of Union Flat CG) | | 1.5 | Decommission | Possible (WIN) project |

Implementation of the treatments described above is dependent upon obtaining sufficient funding and/or human resources from a variety of sources. Sources can include volunteer groups, grants, appropriated funds and funds generated from the sale of wood products. Fluctuating market conditions and the demand for pulpwood products can also influence the amount of available funding.

The following is a treatment summary for the actions proposed under the Gold Project**:**

**Table 1-1. Gold Project Proposed Fuels Treatments:**

| Unit Designation | Estimated Unit Acres | Proposed Treatment | SNFPA Land Allocation | Primary Purpose for Treatment |
|---|---|---|---|---|
| **A** | 210 | Handcut/Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **B** | 138 | Underburn | Threat Zone | Fuels Reduction/Wildlife |
| **C** | 67 | Mastication | Threat Zone | Fuels Reduction |
| **D** | 169 | Handcut/Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **E** | 165 | Handcut/Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **F** | 271 | Underburn | Threat Zone | Fuels Reduction/Wildlife |
| **G** | 34 | Underburn | Threat Zone | Fuels Reduction/Wildlife |
| **H** | 94 | Underburn | Defense Zone | Fuels Reduction/Wildlife |
| **I** | 136 | Underburn | PAC/Threat Zone/HRCA | Fuels Reduction/Wildlife |
| **J** | 25 | Handcut/Tractor Pile | Threat Zone | Fuels Reduction |
| **K** | 65 | Handcut/Tractor Pile | Threat Zone/PAC | Fuels Reduction |
| **N** | 35 | Handcut/Tractor Pile | HRCA | Fuels Reduction |
| **O** | 14 | Handcut/Tractor Pile | Threat Zone | Fuels Reduction |
| **P** | 4 | Handcut/Tractor Pile | Threat Zone | Fuels Reduction |
| **Total** | **1427** | | | |

**Table 1-2. Gold Project Proposed Mechanical Thinning Treatments:**

| Unit Designation | Estimated Unit Acres **(Thinning Only)** | Harvest System | SNFPA Land Allocation | Primary Purpose for Treatment |
|---|---|---|---|---|
| **1** | 12 | Aerial | Threat Zone | Wildlife[1]/Forest Health |
| **2** | 9 | Aerial | Threat Zone | Wildlife[1]/Forest Health |
| **3** | 29 | Aerial | Threat Zone | Wildlife[1]/Forest Health |
| **4** | 7 | Ground | HRCA | Wildlife[1]/Forest Health |
| **5** | 28 | Aerial | HRCA | Wildlife[2]/Forest Health |
| **6** | 6 | Ground | Threat Zone | Wildlife[3]/Forest Health |
| **8** | 17 | Aerial | Threat Zone | Wildlife[3]/Forest Health |
| **10** | 103 | Ground | Threat Zone/HRCA | Wildlife[2]/Forest Health/Fuels Reduction |

| | | | | |
|---|---|---|---|---|
| **11** | 39 | Aerial[1] | Threat Zone | Wildlife¹/Forest Health |
| **13** | 5 | Aerial | HRCA | Wildlife³/Forest Health |
| **14** | 27 | Ground | Threat Zone | Forest Health/Fuels Reduction |
| **15** | 42 | Aerial | Threat Zone/HRCA | Wildlife¹/Forest Health |
| **16** | 30 | Aerial | Threat Zone | Wildlife³/Forest Health |
| **17** | 13 | Ground | Threat Zone | Wildlife³/Forest Health |
| **18** | 32 | Aerial | Threat Zone | Wildlife³/Forest Health |
| **19** | 17 | Aerial | HRCA | Forest Health/Fuels Reduction |
| **21** | 14 | Ground | Defense Zone/HRCA | Forest Health/Fuels Reduction |
| **23** | 76 | Aerial | Defense Zone | Wildlife³/Forest Health |
| **24** | 18 | Aerial | HRCA | Forest Health/Fuels Reduction |
| **27** | 110 | Ground | HRCA | Wildlife³/Forest Health/Fuels Reduction |
| **30** | 35 | Ground | HRCA | Wildlife³/Forest Health/Fuels Reduction |
| **31** | 14 | Ground | Threat Zone | Wildlife³/Forest Health/Fuels Reduction |
| **32** | 12 | Ground | Threat Zone | Wildlife³/Forest Health/Fuels Reduction |
| **33** | 28 | Aerial | Threat Zone | Wildlife☼/Forest Health/Fuels Reduction |
| **34** | 21 | Ground | Threat Zone | Wildlife³/Forest Health/Fuels Reduction |
| **35** | 16 | Ground | Threat Zone | Wildlife³/Forest Health/Fuels Reduction |
| **36** | 33 | Ground | Threat Zone | Wildlife³/Forest Health |
| **37** | 34 | Aerial | Threat Zone | Wildlife³/Forest Health |
| **38** | 62 | Ground | Threat Zone | Wildlife³/Forest Health/Fuels Reduction |
| **39** | 4 | Ground | Threat Zone | Wildlife³/Forest Health/Fuels Reduction |
| **42** | 47 | Aerial | Threat Zone | Wildlife³/Forest Health/Fuels Reduction |
| **Total** | **940** | | | |

Wildlife¹-oak enhancement
Wildlife²-pine enhancement
Wildlife³-structural diversity
Wildlife☼-aspen enhancement

[1] If a skyline yarding system were used, approximately 0.8 miles of temporary road would be needed to access the break in slope.

**Table 1-3. Gold Project Proposed Aspen Restoration Treatments:**

| Unit Designation | Estimated Unit Acres | Harvest System | SNFPA Land Allocation | Primary Purpose for Treatment |
|---|---|---|---|---|
| **50** | 4 | Aerial | Threat Zone | Wildlife☼ |
| **51** | 3 | Aerial | Threat Zone | Wildlife☼ |
| **52** | 4 | Aerial | Threat Zone | Wildlife☼ |
| **53** | 9 | Aerial | Threat Zone | Wildlife☼ |
| **54** | 1 | Aerial | Threat Zone | Wildlife☼ |
| **55** | 1 | Aerial | Threat Zone | Wildlife☼ |
| **Total** | **22** | | | |

Wildlife☼-aspen enhancement

***Note:*** *Some of the units displayed have more than one type of treatment proposed on the unit acreage shown (i.e., Thinning / Mastication). The total cumulative treated area for all activities under this proposed action is approximately 2,120 acres, although specific treatments may add up to an additional number of total acres.*

The following is an estimated acreage summary by proposed treatment:

**Table 1-4. Gold Project Treatment Summary.**

| Treatment | Acres Inside Harvest Units | Acres Outside Harvest Units | Total Treatment Acres |
|---|---|---|---|
| Aspen Restoration | 8 | 14 | 22 |
| Mastication | 12 | 55 | 67 |
| Hand thin, hand pile and burn | 0 | 65 | 65 |
| Underburning | 130 | 543 | 673 |
| Hand thin, tractor pile and burn | 283 | 338 | 621 |
| Mechanical thinning – Ground-based | 477 | 0 | 477 |
| Mechanical thinning - Aerial | 463 | 0 | 463 |
| Precommercial thinning | 9 | 33 | 42 |
| Planting with site prep | 0 | 60 | 60 |
| Planting without site prep | 18 | 55 | 73 |
| **Totals** | **1,401** | **1,162** | **2,563**** |

*****Note****: See note above on cumulative acres*.

All proposed activities would adhere to the Standards and Guidelines contained within the Tahoe National Forest Land and Resource Management Plan (1990) as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (2004). The proposed action would not foreclose options for the long-term maintenance of old forest structural elements or future complimentary fuels reduction activities not proposed under the Gold Project.

**Actions Not Proposed**

No activities are proposed within delineated spotted owl or goshawk Protected Activity Centers (PACs). The use of a registered borate compound (a pesticide used to treat fungi) **is** proposed for use on freshly cut stumps greater than 14" diameter around selected high value trees, recreational areas, or in stands of healthy true fir to prevent the formation of new annosus root disease infection centers; but no other pesticides or herbicides are proposed for use within the Gold project area. No weed treatments are proposed at this time since surveys did not detect weeds within the project area. No activities are proposed within sensitive or watchlist plant occurrences.

## Decision to be Made

The decision to be made is whether to approve the proposed actions as presented in this document, approve an alternative to those proposed actions, or choose to not implement any of the actions proposed. All proposed actions are consistent with the Tahoe National Forest Land and Resource Management Plan as amended. The decision would likely be made in mid- 2010 and implemented in 2011.

# Chapter II – Alternatives Considered

## Public Involvement/Scoping

This project was originally published in the Tahoe National Forest's quarterly *Schedule of Proposed Actions* (SOPA) in April of 2009 and every issue since that time. A public scoping letter was mailed to numerous potentially interested and/or affected individuals on May 14, 2009. A public notice was also put in Grass Valley's *The Union* Newspaper, published on May 14, 2009. Additionally, a public notice was also put in Downieville's *Mountain Messenger* on the same day. As a result of this public scoping, a total of ten letters of comment, plus four requests to be kept informed were received. These comments were used to identify the issues and develop the alternatives included in this Environmental Assessment.

## Issues

Twelve comment/keep informed letters were received and reviewed by the interdisciplinary team. The issues raised in these comment letters were separated into two groups: non-significant and significant. Issues may be considered non-significant for any of four reasons: 1) The issue is outside the scope of the proposed action; 2) The issue is already decided by law, regulation, Forest Plan, or other higher level decision; 3) The issue is irrelevant to the decision to be made; or 4) The issue is conjectural and not supported by scientific or factual evidence. A significant issue is any issue that is not non-significant.

### Non-significant Issues

Public scoping responses included numerous comments, questions, non-issues, and issues that were determined to be non-significant, as defined above, and are addressed in a public comment document included as Appendix B.

### Significant Issues

The following issue(s) were considered significant issues, and as such were used to develop the alternatives presented in this environmental assessment. Below is a brief discussion of each significant issue and how it is addressed in this environmental assessment. See the description of the alternatives in the following section, as well as the '*Comparison of Alternatives'* table located at the end of that section for further information.

- There was one significant issue identified through scoping comments for this project: the potential impacts of removing trees between 20 and 30 inches dbh and reducing canopy cover on habitat for old forest associated species, particularly habitat for the California spotted owl. Commenters recommended fully analyzing an alternative that would implement direction from the 2001 SNFPA ROD to respond to this issue.

- Comply with the court order to analyze a Noncommercial Funding Alternative in detail for projects in the Sierra Nevada Framework national forests that include fuel reduction objectives.

  Alternative D was developed in response to Judge England's November 4, 2009 court order for Case 2:05-cv-00205-MCE-GGH, which requires analysis of a non-commercial funding alternative for Forest Service projects that include a hazardous fuels reduction objective. Alternative D fully analyzes implementing only fuels reduction activities as presented in the purpose and need, and proposed action. No other actions would occur.

## Alternatives

### Alternative A – Proposed Action

This alternative is the Proposed Action, as presented in Chapter 1 of this environmental assessment. Following are in-depth descriptions of each action planned:

**1. Mechanically masticate small conifers and shrubs on approximately 67 acres for reduction of hazardous surface and ladder fuels. Of the 67 acres, approximately 12 acres (all ground-based) would also be mechanically thinned.** Work would be accomplished by use of track laying, low ground pressure equipment and would be limited to operation on slopes no more than 30 percent. Conifers less than 10" dbh and shrubs greater than 18 inches in height would be removed. Leave tree selection would favor sugar pine retention, and would generally retain the largest, healthiest trees. Hardwoods would be released by cutting conifers less than 10 inches dbh within 20 feet of the outer-most branches of healthy individual hardwoods larger than 6" dbh to improve crown development and future forage production. The end result of this activity would improve species diversity, release oak from competition, reduce surface and ladder fuels, reduce crown bulk density, and improve the health of these stands. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**2. Reduce hazardous surface and ladder fuels through hand thinning and tractor piling, on approximately 621 acres. Of the 621 acres, approximately 283 acres would also be mechanically thinned.** Hand cut, tractor pile, and burn small trees and understory shrubs to reduce surface and ladder fuels and improve tree health Leave tree selection would favor sugar pine retention, and would generally retain the largest, healthiest trees. Release hardwoods by cutting conifers less than 10 inches dbh within 20 feet of the outer-most branches of healthy individual hardwoods larger than 6" dbh to improve crown development and future forage production. Tractor pile the cut trees along with other smaller trees and shrubs, slash and debris for burning during periods of low fire danger. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**3. Reduce hazardous surface and ladder fuels through hand thinning and hand piling, on approximately 65 acres. No mechanical thinning would occur.** Hand cut, hand pile, and burn small trees and understory shrubs to reduce surface and ladder fuels and improve tree health. Leave tree selection would favor sugar pine retention, and would generally retain the largest, healthiest trees. Release hardwoods by cutting conifers less than 10 inches dbh within 20 feet of the outer-most branches of healthy individual hardwoods larger than 6" dbh to improve crown development and future forage production. Hand pile the cut trees along with other smaller trees and shrubs, slash and debris for burning during periods of low fire danger. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**4. Underburn approximately 673 acres for hazardous fuels reduction and/or wildlife enhancement. Of the 673 acres, approximately 130 acres would also be mechanically thinned.** Use fire under controlled conditions to burn primarily surface fuels along with some smaller understory vegetation. Hand and/or aerial ignition devices may be used to meet prescribe burn objectives. The expected reduction by size class of dead and down material is 0-.25 inch 100%, .26-1 inch 100%, 1.1-3 inch 80%, greater than 3 inches 50%. Acceptable mortality of conifers less than 10 inch DBH is as follows: 0-3 inch DBH 90-100%, 3.1-6 inch DBH 40-50%, 6.1-10 inch DBH 20-30%. This will modify fuels conditions to reduce fire behavior and corresponding wildfire intensity. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**5. Thin approximately 477 acres with ground-based equipment for forest health, wildlife enhancement, and/or fuels reduction.** Retain all live conifers 30 inches in diameter at breast height or larger, except for hazard trees. In natural stands, retain at least 40 percent canopy cover and at least 40 percent of the existing basal area, generally comprised of the largest trees. Reduce tree densities by removing trees 10 inches in diameter up to 29 inches in diameter. Thin around hardwoods and large conifers and enhance structural diversity primarily by promoting a clumpy tree distribution. Leave healthy sugar pine. All conifers harvested will be whole tree yarded, wherever possible. Favor trees with greater than 40 percent live crown, free of damage or disease, with good form. Leave selected trees with multiple tops when top is over 50 feet above the ground level, and leave trees with hollow cavities for small animal cover. Provide opportunities to recruit additional down wood, by leaving cull logs greater than 15 inches in diameter in the units. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc. Till temporary roads and landings.

**6. Thin approximately 463 acres with aerial-based equipment for forest health, wildlife enhancement, and/or fuels reduction.** Retain all live conifers 30 inches in diameter at breast height or larger except for hazard trees. In natural stands, retain at least 40 percent canopy cover and at least 40 percent of the existing basal area, generally comprised of the largest trees. Reduce tree densities by removing trees 10 inches and greater in diameter up to 29 inches in diameter. Thin around hardwoods and large conifers and enhance structural diversity by promoting a clumpy tree distribution. Leave healthy sugar pine. Limb trees in the woods and lop and scatter material to a depth not to

exceed 18 inches. Yard all stem material to a top diameter of 6 inches, from timber designated for cutting. Favor trees with greater than 40 percent live crown, free of damage or disease, with good form. Leave selected trees with multiple tops when top is over 50 feet above the ground level, and leave trees with hollow cavities for small animal cover. Provide opportunities to recruit additional down wood, by leaving cull logs greater than 15 inches in diameter in the units. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**7. Plant conifers with or without site prep activities on 133 acres.** On 60 acres, site prep by excavator piling of shrubs and surface fuels concentrations prior to planting. Burn piles in the fall. On 133 acres, plant seedlings in clusters of three trees at an average of 25 foot spacing. Plant a mixture of ponderosa pine/Jeffery pine, Douglas-fir, incense-cedar, and sugar pine. True fir will seed in naturally.

**8. Precommercially thin 42 acres of existing plantations**. Hand cut, lop and scatter trees less than 10 inches in diameter, favoring species other than true fir as leave trees.

**9. Thin to enhance oaks within treatment units**. Oak enhancement treatments would be conducted within five of the proposed thinning units. Cut smaller diameter conifers less than 10 inches dbh from beneath and around oaks in units 3, 2, 1, 4, and 11 (in that order of priority, determined by the predominance of oak occuring in the stand). Conifers would be selected to reduce competition, or those that could shade out oaks over time.

**10. Complete Aspen Restoration projects**. Perform the Aspen restoration activities on 22 acres as described on pages 9-10 of this document.

**11. Improve cover for smaller animals and prey species, where cover and/or large log structures are lacking**. Improve cover for smaller animals and prey species, where cover and/or large log structures are lacking, by cutting slash and smaller diameter trees (less than 10 inches diameter) and re-arranging them to create cover piles and log structures, within treated units. Priority areas would be near riparian areas and within sensitive wildlife species habitat. Cover piles would not be placed in areas of sensitive plants. Cover piles are proposed within approximately 10 percent of the area within proposed units. In general, cover piles will not exceed an average of 10 per acre. The district biologist would coordinate with the district fuels specialist to locate these log structures and cover piles to avoid site-specific fuels concerns at the time of project implementation.

**12. Protect large trees.** Remove heavy accumulations of duff and down material from around the boles of selected large trees greater than 30 inches dbh for added protection before underburning.

**13**. **Treat freshly cut stumps with registered borate compound**. Around individual high value trees, in recreational areas, or in stands of healthy true fir, treat freshly cut stumps greater than 14" diameter with a registered borate compound to minimize the creation of new root disease infection centers.

**14. Enhance/Regenerate Bear Grass.** Hand cut less than ¼ acre in total of the shrubs in the bear grass area in Section 19, northwest of New York Ravine, and west of Unit 10, and pile the shrubs outside the bear grass patch.

**15**. **Reconstruct approximately 1 mile of road.** The road to be reconstructed is 93-7.

**16. Offer sawtimber and biomass material for removal**. Through Forest Service contracts, offer sawtimber and biomass material for removal.

**17. Identify and remove hazardous trees along Forest Service system roads within units**. Remove Hazards Created by Danger Trees: Per district hazard tree guidelines (available upon request, at Yuba River RD), identify and remove hazardous trees along maintenance level 3, 4, and 5 National Forest System roads and high-use recreational/administrative sites. In either case, hazardous trees would be removed within thinning unit boundaries only.

**18**. **Maintain National Forest System Roads.** Maintain some National Forest System Roads to provide access to treatment areas, provide for public and contractor safety, and improve watershed conditions through erosion control and road surface protection.

**19. Close or decommission unneccessary roads**. Eliminate unnecessary Forest Service or temporary roads to reduce the negative effects on the environment. Close approximately 1 mile and decommission approximately 4.1 miles of roads. (See page 13 of this document for a complete list.)

This action responds to the goals and objectives outlined in the Tahoe National Forest Land and Resource Management Plan (LRMP)(1990) as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (2004), and helps move the project area toward the desired conditions described in the Forest Plan. The project area lies within the Lavezzola and Forty-Niner Management Areas of the LRMP.

The land allocations within the Gold project area, as identified in the SNFPA are: Wildland Urban Interface (WUI) threat and defense zones, Home Range Core Areas (HRCAs), Protected Activity Centers (PACs), Old Forest, and General Forest. Proposed management activities are consistent with the desired conditions, management intents, and management objectives for these land allocation described in the 2004 SNFPA ROD (pp. 45 through48). This alternative is consistent with the Tahoe National Forest Land and Resource Management Plan (LRMP), (36 CFR 219.10 (c)).

**Note:** All acres are approximate, and some treatments overlap, therefore simply adding acres for a cumulative total acreage count is not accurate.

**Alternative B - (No Action)**

This alternative does not implement any of actions proposed. No underburning, masticating, or fuels reduction treatments would be accomplished. No mechanical thinning would be completed. Thinning around hardwoods, creation of cover piles for wildlife, as well as aspen restoration, planting and precommercial thinning would not be accomplished. No wood products would be generated, nor roads decommissioned. Forest vegetation would continue in its current condition and trend. Fuels would only be modified through wildfires.

Under this alternative, routine land stewardship, including fire suppression, road maintenance, or other administrative activities that address threats to life and property, would continue.

This alternative complies with 40 CFR 1502.14(d), which requires that a no-action alternative be included in the analysis.

**Alternative C – 2001 Framework Alternative**

The following is a treatment summary for the actions proposed under Alternative C of the Gold Project**:**

| Treatment | Acres Inside Harvest Units | Acres Outside Harvest Units | Total Treatment Acres |
|---|---|---|---|
| Aspen Restoration | 8 | 14 | 22 |
| Mastication | 12 | 55 | 67 |
| Hand thin, hand pile and burn | 0 | 65 | 65 |
| Underburning | 115 | 558 | 673 |
| Hand thin, tractor pile and burn | 215 | 406 | 621 |
| Mechanical thinning – Ground-based | 353 | 0 | 353 |
| Mechanical thinning - Aerial | 424 | 0 | 424 |
| Precommercial thinning | 8 | 34 | 42 |
| Planting with site prep | 0 | 60 | 60 |
| Planting without site prep | 10 | 63 | 73 |
| **Totals (with min. Aspen acres)** | **1,145** | **1,255** | **2,400**** |

***Note**: Acres are approximate and may overlap.*

This alternative was developed from comments received during public scoping. This alternative limits the removal of trees to an upper diameter limit of 20 inches dbh outside of the defense zone, and limits average stand canopy cover to no less than 50 percent outside of the defense zone to address concerns about the potential impacts of removing trees between 20 and 30 inches dbh and reducing canopy cover on habitat for old forest associated species, particularly the California spotted owl. Following are in-depth descriptions of each action planned:

**1. Mechanically masticate small conifers and shrubs on approximately 67 acres for reduction of hazardous surface and ladder fuels. Of the 67 acres, approximately 12 acres (all ground-based) would also be mechanically thinned.** Work would be accomplished by use of track laying, low ground pressure equipment and would be limited to operation on slopes no more than 30 percent. Conifers less than 10" dbh and shrubs greater than 18 inches in height will be removed. Leave tree selection would favor sugar pine retention, and would generally retain the largest, healthiest trees. Hardwoods would be released by cutting conifers less than 10 inches dbh within 20 feet of the outer-most branches of healthy individual hardwoods larger than 6" dbh to improve crown development and future forage production. The end result of this activity would improve species diversity, release oak from competition, reduce surface and ladder fuels, reduce crown bulk density, and improve the health of these stands. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**2. Reduce hazardous surface and ladder fuels through hand thinning and tractor piling, on approximately 621 acres. Of the 621 acres, approximately 215 acres would also be mechanically thinned.** Hand cut, tractor pile, and burn small trees and understory shrubs to reduce surface and ladder fuels and improve tree health Leave tree selection would favor sugar pine retention, and would generally retain the largest, healthiest trees. Release hardwoods by cutting conifers less than 10 inches dbh within 20 feet of the outer-most branches of healthy individual hardwoods larger than 6" dbh to improve crown development and future forage production. Tractor pile the cut trees along with other smaller trees and shrubs, slash and debris for burning during periods of low fire danger. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**3. Reduce hazardous surface and ladder fuels through hand thinning and hand piling, on approximately 65 acres.** Hand cut, hand pile, and burn small trees and understory shrubs to reduce surface and ladder fuels and improve tree health. Leave tree selection would favor sugar pine retention, and would generally retain the largest, healthiest trees. Release hardwoods by cutting conifers less than 10 inches dbh within 20 feet of the outer-most branches of healthy individual hardwoods larger than 6" dbh to improve crown development and future forage production. Hand pile the cut trees along with other smaller trees and shrubs, slash and debris for burning during periods of low fire danger. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**4. Underburn approximately 673 acres for hazardous fuels reduction and/or wildlife enhancement. Of the 673 acres, approximately 115 acres would also be mechanically thinned.** Use fire under controlled conditions to burn primarily surface fuels along with some smaller understory vegetation. Hand and/or aerial ignition devices may be used to meet prescribe burn objectives. The expected reduction by size class of dead and down material is 0-.25 inch 100%, .26-1 inch 100%, 1.1-3 inch 80%, greater than 3 inches 50%. Acceptable mortality of conifers less than 10 inch DBH is as follows: 0-3 inch DBH 90-100%, 3.1-6 inch DBH 40-50%, 6.1-10 inch DBH 20-30%. This will modify fuels conditions to reduce fire behavior and corresponding wildfire intensity.

Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**5. Thin approximately 353 acres with ground-based equipment for forest health, wildlife enhancement, and/or fuels reduction.** Retain all live conifers 12 inches in diameter at breast height (dbh) or larger in CWHR 5M, 5D, and 6 (4N or greater timber strata) and in HRCAs where the requirements of a home range core area cannot be met. Retain all live conifers 20 inches dbh or larger in the threat zone of the WUI, except for hazard trees. Retain all live conifers 30 inches dbh or larger in the defense zone of the WUI, except for hazard trees. In natural stands, retain at least 50 percent canopy cover in areas outside of the Defense Zone of the WUI. Reduce tree densities by removing trees 10 inches and greater in diameter up to the allowable diameter limits. Thin around hardwoods and large conifers and enhance structural diversity primarily by promoting a clumpy tree distribution. Leave healthy sugar pine. All conifers harvested will be whole tree yarded, wherever possible. Favor trees with greater than 40 percent live crown, free of damage or disease, with good form. Leave selected trees with multiple tops when top is over 50 feet above the ground level, and leave trees with hollow cavities for small animal cover. Provide opportunities to recruit additional down wood, by leaving cull logs greater than 15 inches in diameter in the units. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc. Till temporary roads and landings.

**6. Thin approximately 424 acres with aerial-based equipment for forest health, wildlife enhancement, and/or fuels reduction.** Retain all live conifers 12 inches in diameter at breast height (dbh) or larger in CWHR 5M, 5D, and 6 (4N or greater timber strata) and in HRCAs where the requirements of a home range core area cannot be met. Retain all live conifers 20 inches dbh or larger in the threat zone of the WUI, except for hazard trees and conifers in aspen restoration units. Retain all live conifers 30 inches dbh or larger in the defense zone of the WUI, except for hazard trees and in aspen restoration units. In natural stands, retain at least 50 percent canopy cover in areas outside of the Defense Zone of the WUI, except for aspen restoration units. Reduce tree densities by removing trees 10 inches and greater in diameter up to the allowable diameter limits. Thin around hardwoods and large conifers and enhance structural diversity by promoting a clumpy tree distribution. Leave healthy sugar pine. Limb trees in the woods and lop and scatter material to a depth not to exceed 18 inches, except for aspen restoration units.

Yard all stem material to a top diameter of 6 inches, from timber designated for cutting. Favor trees with greater than 40 percent live crown, free of damage or disease, with good form. Leave selected trees with multiple tops when top is over 50 feet above the ground level, and leave trees with hollow cavities for small animal cover. Provide opportunities to recruit additional down wood, by leaving cull logs greater than 15 inches in diameter in the units. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**7. Plant conifers with or without site prep activities on 133 acres.** On 60 acres, site prep by excavator piling of shrubs and downed fuels concentrations prior to planting.

Burn piles in the fall. On 133 acres, plant seedlings in clusters of three trees at an average of 25 foot spacing. Plant a mixture of ponderosa pine/Jeffery pine, Douglas-fir, incense-cedar, and sugar pine. True fir will seed in naturally.

**8. Precommercially thin 42 acres of existing plantations**. Hand cut, lop and scatter trees less than 10 inches in diameter, favoring species other than true fir as leave trees.

**9. Thin to enhance oaks within treatment units**. Oak enhancement treatments would be conducted within five of the proposed thinning units. Cut smaller diameter conifers less than 10 inches dbh from beneath and around oaks in units 3, 2, 1, 4, and 11 (in that order of priority, determined by the predominance of oak occuring in the stand). Conifers would be selected to reduce competition, or those that could shade out oaks over time.

**10. Complete Aspen Restoration projects**. Perform the Aspen restoration activities on 22 acres as described on pages 9-10 of this document.

**11. Improve cover for smaller animals and prey species, where cover and/or large log structures are lacking**. Improve cover for smaller animals and prey species, where cover and/or large log structures are lacking, by cutting slash and smaller diameter trees (less than 10 inches diameter) and re-arranging them to create cover piles and log structures, within treated units. Priority areas would be near riparian areas and within sensitive wildlife species habitat. Cover piles would not be placed in areas of sensitive plants. Cover piles are proposed within approximately 10 percent of the area within proposed units. In general, cover piles will not exceed an average of 10 per acre. The district biologist would coordinate with the district fuels specialist to locate these log structures and cover piles to avoid site-specific fuels concerns at the time of project implementation.

**12. Protect large trees.** Remove heavy accumulations of duff and down material from around the boles of selected large trees greater than 30 inches dbh for added protection before underburning.

**13**. **Treat freshly cut stumps with registered borate compound**. Around individual high value trees, in recreational areas, or in stands of healthy true fir, treat freshly cut stumps greater than 14" diameter with a registered borate compound to minimize the creation of new root disease infection centers.

**14. Enhance/Regenerate Bear Grass.** Hand cut less than ¼ acre in total of the shrubs in the bear grass area in Section 19, northwest of New York Ravine, and west of Unit 10, and pile the shrubs outside the bear grass patch.

**15**. **Reconstruct approximately 1 mile of road.** The road to be reconstructed is 93-7.

**16. Offer sawtimber and biomass material for removal**. Through Forest Service contracts, offer sawtimber and biomass material for removal.

**17. Identify and remove hazardous trees along Forest Service system roads within units**. Remove Hazards Created by Danger Trees: Per district hazard tree guidelines (available upon request, at Yuba River RD), identify and remove hazardous trees along maintenance level 3, 4, and 5 National Forest System roads and high-use recreational/administrative sites. In either case, hazardous trees would be removed within thinning unit boundaries only.

**18**. **Maintain National Forest System Roads.** Maintain some National Forest System Roads to provide access to treatment areas, provide for public and contractor safety, and improve watershed conditions through erosion control and road surface protection.

**19. Close or decommission unneccessary roads**. Close or decommission unnecessary Forest Service or temporary roads to reduce the negative effects on the environment. Close approximately 1 mile and decommission approximately 4.1 miles of roads. (See page 13 of this document for a complete list.)

This action responds to the goals and objectives outlined in the Tahoe National Forest Land and Resource Management Plan (LRMP)(1990) as amended by the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (2004), and helps move the project area toward the desired conditions described in the Forest Plan. The project area lies within the Lavezzola and Forty-Niner Management Areas of the LRMP.

The land allocations within the Gold project area, as identified in the SNFPA are: Wildland Urban Interface (WUI) threat and defense zones, Home Range Core Areas (HRCAs), Protected Activity Centers (PACs), Old Forest, and General Forest. Proposed management activities are consistent with the desired conditions, management intents, and management objectives for these land allocation described in the 2004 SNFPA ROD (pp. 45 through 48). This alternative is consistent with the Tahoe National Forest Land and Resource Management Plan (LRMP), (36 CFR 219.10 (c)).

**Note:** All acres are approximate, and some treatments overlap, therefore simply adding acres for a cumulative total acreage count is not accurate.

### Alternative D – Noncommercial Funding Alternative

This Alternative complies with the requirement to include a Noncommercial Funding Alternative at the project level. This alternative's sole purpose is to achieve the fuels reduction element of the purpose and need, with all proposed treatments being solely directed at reducing hazardous fuels. Following are in-depth descriptions of each action planned:

**1. Mechanically masticate small conifers and shrubs on approximately 67 acres for reduction of hazardous surface and ladder fuels.** Work would be accomplished by use of track laying, low ground pressure equipment and would be limited to operation on slopes no more than 30 percent. Conifers less than 10" dbh and shrubs greater than 18 inches in height will be removed. The end result of this activity would reduce surface

and ladder fuels. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**2. Reduce hazardous surface and ladder fuels through hand thinning and tractor piling, on approximately 621 acres.** Hand cut, tractor pile, and burn small trees and understory shrubs to reduce surface and ladder fuels. Tractor pile the cut trees along with other smaller trees and shrubs, slash and debris for burning during periods of low fire danger. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

**3. Underburn approximately 673 acres for hazardous fuels reduction.** Use fire under controlled conditions to burn primarily surface fuels along with some smaller understory vegetation. Hand and/or aerial ignition devices may be used to meet prescribe burn objectives. The expected reduction by size class of dead and down material is 0-.25 inch 100%, .26-1 inch 100%, 1.1-3 inch 80%, greater than 3 inches 50%. Acceptable mortality of conifers less than 10 inch DBH is as follows: 0-3 inch DBH 90-100%, 3.1-6 inch DBH 40-50%, 6.1-10 inch DBH 20-30%. This will modify fuels conditions to reduce fire behavior and corresponding wildfire intensity. Follow mitigations in the EA for Limited Operating Periods (LOPs), riparian requirements, etc.

Below, is a table showing the units, the proposed treatment, and the approximate acres for this alternative:

| Unit Designation | Estimated Unit Acres | Proposed Treatment | SNFPA Land Allocation | Primary Purpose for Treatment |
|---|---|---|---|---|
| **A** | 210 | Handcut/Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **B** | 138 | Underburn | Threat Zone | Fuels Reduction |
| **C** | 67 | Mastication | Threat Zone | Fuels Reduction |
| **D** | 169 | Handcut/Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **E** | 165 | Handcut/Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **F** | 271 | Underburn | Threat Zone | Fuels Reduction |
| **G** | 34 | Underburn | Threat Zone | Fuels Reduction |
| **H** | 94 | Underburn | Defense Zone | Fuels Reduction |
| **I** | 136 | Underburn | PAC/Threat Zone/HRCA | Fuels Reduction |
| **J** | 25 | Handcut/Tractor Pile | Threat Zone | Fuels Reduction |
| **K** | 65 | Handcut/Tractor Pile | Threat Zone/PAC | Fuels Reduction |
| **N** | 35 | Handcut/Tractor Pile | HRCA | Fuels Reduction |
| **O** | 14 | Handcut/Tractor Pile | Threat Zone | Fuels Reduction |
| **P** | 4 | Handcut/Tractor Pile | Threat Zone | Fuels Reduction |
| **Total** | **1,427** | | | |

This alternative is consistent with the Tahoe National Forest Land and Resource Management Plan (LRMP), (36 CFR 219.10 (c)).

## Management Requirements Common to All Alternatives

In response to both internal and public comments on the proposal, management requirements were developed to reduce or prevent some of the potential impacts the various proposed actions may cause. The following management requirements would be applied to Alternatives A and C. Those management requirements applicable to the actions proposed in Alternative D would be implemented under Alternative D.

**Table 2-1. Management Requirements**

| Area of Concern | Management Requirement Designed to Reduce or Prevent Undesirable Effect | Responsible Persons |
|---|---|---|
| **Cultural Resources** - Management of Linear Features. | Directionally fell trees parallel to or away from linear features; existing breaches may be used; if necessary, new breaches would be designated by the District Archaeologist; isolated trees inside of linear features may be felled on a case-by-case basis and with on-the-ground approval of the District Archaeologist, only if removal benefits the feature. | District Archaeologist, Layout/Contract Specialist, Sale Administrator, Service Contract COR |
| **Cultural Resources** - Management of Sites. | Protect cultural resources with posted and/or flagged control areas. Utilize directional felling methods as appropriate to protect resources. Designate sites on the ground prior to work. Sale Administrator and/or Archaeologist would walk all affected sites with purchaser prior to start of felling activities. | District Archaeologist, Layout/Contract Specialist, Sale Administrator, Service Contract COR |
| **Cultural Resources** - Management of Sites. | Protect sites from adverse effects from controlled burning. The district archeologist will determine which sites can be burned over. For sites that can be burned over, fire control lines will be constructed off site and sites will not be used as staging areas or for parking vehicles and equipment. | District Archaeologist, Fuels Specialist, Burn Boss |

| Area of Concern | Management Requirement Designed to Reduce or Prevent Undesirable Effect | Responsible Persons |
|---|---|---|
| **Cultural Resources –** Felling and removal of trees within Sites. | Only hazard or wind throw trees would be removed from sites. Implement on-site tree removal only upon written approval of the Forest Cultural Resource Manager (CRM). All trees would be directionally felled and fully suspended during removal from site. Removal of trees would follow the guidelines established in the First Amended Regional Programmatic Agreement Regarding Compliance with Section 106 of the National Historic Preservation Act. An Archaeologist would be present during felling and removal of trees. | District Archaeologist, Layout/Contract Specialist, Sale Administrator |
| **Noxious/Invasive Exotic Weed Management** – Prevention | Ensure that all equipment used in the project area is weed free. | District ecologist, Layout/ Contract Specialist, Sale administrator, Service Contract COR |
| **Noxious/Invasive Exotic Weed Management** – Erosion control | Use only weed free plant materials for erosion control (if needed) to prevent introduction of noxious/invasive exotic weeds. | District ecologist, Layout/Contract Specialist, Sale administrator, Service Contract COR |
| **Noxious/Invasive Exotic Weed Management –** Prevention | Wash equipment that operates off of roads to reduce the risk of weed introduction. | District ecologist, Layout/Contract Specialist, Sale administrator, Service Contract COR |
| **Rare Plant Management –** Sensitive and watchlist plants/plant communities | Unless otherwise agreed to by a riparian specialist, fall conifers away from riparian vegetation. If conifers fall within riparian vegetation, leave them on the ground. | District ecologist/biologist, Layout/Contract Specialist, Sale administrator, Service Contract COR |
| **Rare Plant Management –** Sensitive and watchlist plants/plant communities | No direct ignition within riparian vegetation. Do not pile and burn within riparian vegetation. | Fuels specialist, Burn Boss |

| Area of Concern | Management Requirement Designed to Reduce or Prevent Undesirable Effect | Responsible Persons |
|---|---|---|
| **Rare Plant Management –** Sensitive and watchlist plants/ plant communities | Buffer the *Lewisia kelloggii* ssp. *hutchisonii* occurrence by 100 feet. | District ecologist, Layout/Contract Specialist, Sale administrator, Service Contract COR |
| **Forest Vegetation** | During harvest operations in mechanical thinning units: Where available, retain 5 percent or more of the total treatment area in lower layers composed of trees 6 to 24 inches dbh. | Silviculturist, Sale Prep Officer, and Sale Administrator. |
| **Forest Vegetation** | Apply a registered borate compound to cut conifer stumps > 14 inches dbh in order to reduce the chance of new infection centers being created through harvest activity. Borate would be applied in units 23, 27, 32, and 39. | Silviculturist and Sale Administrator. |
| **Forest Vegetation-** | Plant landings with a mixture of conifer species that is appropriate for the site. | Silviculturist and Culturist |
| **Forest Vegetation/ Wildlife/Fuels** | As site specific conditions warrant, line (at the dripline) or rake duff and bark sluff to the dripline of large $\geq$ 30" dbh ponderosa and sugar pine before prescribed burning. | Silviculturist and Fuels Specialist |
| **Forest Vegetation-** Aspen | Within aspen units: (1) Stage fall conifers to minimize damage to riparian vegetation, including aspen trees and sprouts, (2) Sale Administrator or COR will work on the ground with a riparian specialist to meet the above objectives. | Riparian specialist, Layout/Contract Specialist, Sale administrator and Service Contract COR |
| **Wildlife** – Northern goshawk | To protect the northern goshawk, Limit the Operating Period so that activities do not occur from February 15 through September 15 (unless surveys in the future determine that this is not necessary) in the following units: 21, 30, 31, 37, 38, 79, 80, 82, 83, D, H, I (northern half), K. | District biologist, Layout/Contract Specialist, Sale administrator, and Service Contract COR |
| **Wildlife** – California spotted owl & northern goshawk | To protect the California spotted owl and the northern goshawk, coordinate the location of all helicopter landings and helicopter flight paths to be sure that appropriate limited operating periods are included. Helicopter activity should generally not occur within 0.5 mile of activity centers (unless surveys determine that this is not necessary). | District biologist, Layout/Contract Specialist and Sale Administrator |

| Area of Concern | Management Requirement Designed to Reduce or Prevent Undesirable Effect | Responsible Persons |
|---|---|---|
| **Wildlife—**Meadow edge within Units 42 and 53 | To insure that wildlife objectives are met, coordinate marking within the 300-foot meadow edge with a wildlife biologist. | Layout/Contract Specialist, District Biologist |
| **Wildlife** - TES | If new Threatened, Endangered, or Forest Service Sensitive (TES) species are listed or discovered or nesting TES are found within 0.25 mile of activities, a limited operating period will be implemented as recommended by a qualified biologist. | District biologist, Layout/Contract Specialist, Sale administrator, and Service Contract COR |
| **Wildlife** - Snags | Within RCAs, fall and leave hazardous snags that are a threat to administrators or operational personnel (per OSHA requirements). | Layout/Contract Specialist, Sale Administrator and Service Contract COR. |
| **Wildlife -** Large Tree Retention/ Snag Recruitment | Outside of aspen restoration units, no snags will be created from trees that are $\geq$ 30 inches dbh. | District Biologist |
| **Wildlife -** Aspen Units | Prior to implementing treatments, conduct mountain yellow-legged frog surveys within all drainages that lie within 500 feet of any treatment at least every three years | District Biologist |
| **Wildlife** – Landing locations | Locate landings to avoid removing large trees, large snags, and large downed logs. Sale Preparation and Administration staff will coordinate with other resource specialists (botany, aquatics, wildlife, archaeology) the placement of additional landings that are outside of units or that are in addition to those that appear on the map in this Environmental Analysis. Locate landings outside of Riparian Conservation Areas, unless otherwise coordinated. | Resource specialists, Layout/Contract Specialist, Sale administrator, and Service Contract COR |
| **Wildlife—**Landing Construction and Use | No new construction of landings in RCAs. Consult with an aquatic biologist before using an existing landing located in an RCA. | Resource specialists, Layout/Contract Specialist, Sale administrator, and Service Contract COR |
| **Aquatics/ Wildlife -** Drafting | To protect aquatic resources, coordinate all drafting sites with the District Biologist prior to use. Use drafting devices with 2-mm or less screening device and draft from the deepest part of the pool. | Sale Admin. and Biologist |

| Area of Concern | Management Requirement Designed to Reduce or Prevent Undesirable Effect | Responsible Persons |
|---|---|---|
| **Watershed, Aquatic Resources, Soils, and Roads –** Road Decommissioning | After all restoration projects have been completed, decommission identified roads by tilling and close to all vehicle traffic with log and earth or boulder and earth barriers. Mulch barriers with slash, wood chips or weed free rice straw. Facilitate recovery by removing culverts; install waterbars, and leaving vegetated areas undisturbed as determined by the soil scientist or hydrologist. Allow to revegetate naturally. | Hydrologist, Road Maintenance Engineer |
| **Watershed, Soils, & Aquatic Resources** – Stream Buffers | Establish a 100-foot "riparian buffer" zone along each side of perennial streams, 50-foot "riparian buffer" along each side of intermittent streams and establish a 25-foot "riparian buffer" zone along each side of ephemeral streams. These zones provide for shade and coarse large woody debris (CWD) to the stream channel and adjacent land. Unless otherwise agreed to by a riparian specialist: 1) no harvest or ground-disturbing activities would occur within the 100- or 50-foot riparian buffers, (2) no ground disturbing activities would occur within the 25-foot ephemeral buffer. as described under BMP 1.8 RIPARIAN CONSERVATION AREA DESIGNATION "Vegetation Management Requirements" below and in the RCA Guidelines in Appendix C. | Planning Forester, Prep Forester, SA |
| **Watershed / Wildlife –** Hazard Trees within RCAs | Fall and leave safety hazard trees within 50' or 100' "riparian buffer", unless otherwise agreed by a hydrologist or aquatic biologist. | Sale Admin. |
| **Watershed, Soils, & Aquatic Resources** – Slope limitations for ground-based equipment. | Limit ground-based equipment (tractors and masticators) to slopes generally less than 30% outside of RCAs. Field review tractor unit boundaries by a hydrologist or soil scientist. Limit ground-based equipment to slopes less than 20% within all RCAs. | Planning and Prep Forester, Hydrologist, Soil Scientist. |

| Area of Concern | Management Requirement Designed to Reduce or Prevent Undesirable Effect | Responsible Persons |
|---|---|---|
| **Watershed, Soils, & Aquatic Resources** – Skid trail locations/full suspension in RCAs | Locate skid trails at least 75 feet apart except where they converge near a landing. Trees would be directionally felled in tractor units to minimize the number of skid trails and associated ground disturbance. Use end-lining to designated skid trails. No end-lining within RCAs. In cable operations within RCAs, full suspension is required in riparian buffers and partial suspension is required outside riparian buffers. | Planning Forester, Prep Forester, SA. |
| **Watershed, Soils, & Aquatic Resources** – Soils moisture | Allow skidding operations only when soil moisture conditions are such that compaction, gullying, and/or rutting will be minimal. Equipment may operate on designated skid trails when soils are dry to a minimum of 4 inches. Low-ground-pressure equipment may operate off of designated skid trails when soils are dry to a depth of 4 inches. High-ground-pressure equipment may operate off of designated skid trails when soils are dry to a minimum depth of 8 inches. Off of designated skid trails, limit all equipment passes over the same piece of ground to reduce the potential for adverse soil compaction. Outside normal operating season (NOS) or during wet periods within the NOS, utilize the TNF Wet Weather Operations Guidelines. | Planning Forester, Prep Forester, SA, Soil Scientist, CORs, Hydrologist. |
| **Watershed, Soils, & Aquatic Resources** – Tilling roads, landings and skid trails | Deep till temporary roads, landings, and portions of skid trails within 100' of landings. Mulch barriers with slash, wood chips or weed free rice straw. | Planning Forester, Prep Forester, SA, Soil Scientist, Hydrologist |
| **Watershed, Soils, & Aquatic Resources –** Landing construction & use | No new construction of landings in RCAs. Consult with hydrologist or aquatic biologist before using an existing landing located in a RCA. | Planning Forester, Prep Forester, SA. Hydrologist, Aquatic Biologist. |
| **Watershed, Soils, & Aquatic Resources** - Roads | Place rock on roads at stream crossings and segments within identified RCAs to reduce the impact of sediment delivery to associated stream courses. Place rock, slash, or certified weed-free rice straw at the outlets of rolling dips and/or waterbars to dissipate water where identified by road engineer and soil scientist, and/or hydrologist. | Design Engineer, Soil Scientist, SA, Hydrologist. |

| Area of Concern | Management Requirement Designed to Reduce or Prevent Undesirable Effect | Responsible Persons |
|---|---|---|
| **Watershed, Soils, & Aquatic Resources** - Waterbars | Waterbar spacing: use moderate or high Erosion Hazard Rating for spacing guidelines based on site conditions and residual slash amounts. Pull berms back on skid trails where ground conditions are appropriate. Cable corridors will be hand waterbarred and mulched, if needed. Additional mulch and waterbars may be needed after underburning. | Design Engineer, Soil Scientist, SA, Hydrologist. |
| **Watershed, Soils, Wildlife & Aquatic Resources** – Riparian buffers/burning | During prescribed fire prep and implementation, in all units with prescribed fire, to minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within the 100-foot perennial and 50-foot intermittent "riparian buffer", unless otherwise agreed by a hydrologist, soil scientist, or aquatic biologist. Fire may back into the 100-foot perennial and 50-foot intermittent "riparian buffer". No pile burning will occur within the 100-foot perennial and 50-foot intermittent "riparian buffer". Direct ignition may occur within the 25-foot ephemeral "riparian buffer". | District Fuels Specialist, District Fire Management Officer |
| **Watershed, Soils, Wildlife & Aquatic Resources** – Soil cover and coarse woody debris retention | In all units with thinning and fuels treatment activities, maintain 50 to 60% effective soil cover, with 60% effective soil cover maintained in aerial thinning units.<br><br>Retain as much existing coarse woody debris as possible during underburn operations, emphasizing large downed logs. | Soil Scientist, Culturist, Burn Boss and District Fire Management Officer |
| **Watershed, Soils, & Aquatic Resources** – Implementation of BMPs | To reduce the potential for adverse cumulative watershed effects, implement state certified Best Management Practices (BMPs) (USDA 2000). | Planning Forester, Prep Forester, SA. Hydrologist, Aquatic Biologist. |
| Wildlife/Watershed **- BMPs** | Implement site-specific Best Management Practices (BMPs) (Appendix B). The State and Regional Boards entered into an agreement with the U.S. Forest Service which requires the agency to control non-point source discharges by implementing control actions certified by the State Board as Best Management Practices (BMPs). BMPs are designed to protect water quality including sediment, turbidity, and water temperature. | District hydrologist, Layout/Contract Specialist, Sale administrator, and Service Contract COR |

<table>
<tr><th>Area of Concern</th><th>Management Requirement Designed to Reduce or Prevent Undesirable Effect</th><th>Responsible Persons</th></tr>
<tr><td>Watershed/ Wildlife-RCAs</td><td>Vegetation and fuels management activities within the RCA are governed by the attached Riparian Conservation Area RCA Guidelines (Appendix C). These guidelines are intended to minimize the risk of sediment delivery to aquatic systems from management activities within the project area.</td><td>District hydrologist, Layout/Contract Specialist, Sale administrator, and Service Contract COR</td></tr>
<tr><td>Watershed, Soils, & Aquatic Resources – RCA guidelines/widths</td><td>Establish Riparian Conservation Areas (RCA) for all streamcourses. Ensure RCOs are met within RCAs. Follow “RCA Guidelines” in Appendix C for activities within RCAs. The RCA widths are as follows:
<table>
<tr><th>Stream Type</th><th>Width of Riparian Conservation Area</th></tr>
<tr><td>Perennial Streams</td><td>300 feet each side, measured from bank full edge</td></tr>
<tr><td>Seasonal Flowing Streams</td><td>150 feet each side, measured from bank full edge</td></tr>
<tr><td>Streams In Inner Gorge</td><td>Top of inner gorge</td></tr>
<tr><td>Meadows, Lakes, and Springs</td><td>300 feet from edge of feature or riparian vegetation, whichever is greater</td></tr>
</table></td><td>Planning Forester, Prep Forester, SA. Hydrologist, Aquatic Biologist.</td></tr>
<tr><td>Safety – Mechanical Operations</td><td>Ensure designated landing or disposal sites are of adequate size to accommodate OSHA safety requirements and the anticipated amount of residual limb and top wood that will result from Whole-Tree-Yarding within ground-based harvest system units.</td><td>Layout/Contract Specialist, Sale Administrator and Service Contract COR</td></tr>
<tr><td>Fuels Reduction – Activity Fuels Treatment</td><td>Within ground-based harvest system units, Whole-Tree-Yarding is required.</td><td>Layout/Contract Specialist, Sale Administrator and Service Contract COR</td></tr>
<tr><td>Fuels Reduction – Activity Fuels Treatment</td><td>Outside of handpile disposal strips and within aerial-based harvest system units, yard material to a 6 inch top DIB and scatter activity fuels (generated logging slash) to a depth of 18 inches.</td><td>Layout/Contract Specialist, Sale Administrator.</td></tr>
</table>

| Area of Concern | Management Requirement Designed to Reduce or Prevent Undesirable Effect | Responsible Persons |
|---|---|---|
| **Transportation -** System Road Maintenance | Identify Forest System Roads that are unsuitable for haul or where hauling is restricted on Sale Area Map. | Layout/Contract Specialist, Sale Administrator and Service Contract COR. |
| **Transportation -** System Road Maintenance | Maintain log haul roads before, during and after use. Maintain surface drainage structures to reduce erosion potential. | Layout/Contract Specialist, Sale Administrator and Service Contract COR. |

In addition to the above listed management requirements, the following BMPs to protect water quality and riparian resources, listed below, must be followed.

**Best Management Practices**

1.1 RESOURCE MANAGEMENT PLANNING PROCESS

The Interdisciplinary (ID) Team included a hydrologist, soil scientist, aquatic biologist, wildlife biologist, forester, fuels specialist and transportation planner who identified sensitive soils and riparian conservation areas (RCAs). They identified specific mitigation measures for these areas as documented in the following BMPs and in soil ground cover retention needs. They also evaluated soil and watershed responses to the proposed fuels reduction activities including underburning, cut/pile/burn, mastication, and biomass/thin. (ID Team - During environmental analysis process)

1.2 RESOURCE MANAGEMENT UNIT DESIGN

All resource management units are designed to secure favorable conditions of water flow and water quality by conforming to Forest Service guidelines, National Forest Management Act (NFMA) requirements, and topographic features. Consistent with equipment capabilities, units are generally bounded by roads and natural features such as ridges, minor stream channels, and riparian conservation areas (RCAs). (Planning Forester, Fuels Specialist, Hydrologist - During environmental analysis process)

1.3 USE OF EROSION HAZARD RATING (EHR) FOR RESOURCE MANAGEMENT UNIT DESIGN

An EHR was completed for all potential units using the Forest Soils Resource Inventory (SRI). For units with an overall EHR rated "high" (EHR = 13-29), mitigation measures will be applied which prevent the concentration of surface flows, such as designated skid trails or prohibition of ground-based equipment. Units with a "very high" erosion hazard rating (EHR = >30) will be reviewed by a soil scientist. (Soil Scientist - During environmental analysis process for Preliminary EHRs; Soil Scientist, Prep Forester - During Sale Prep for Confirmation of EHRs for Certain Units, Fuels Specialist - For Prescribed Burns)

1.4 USE OF PROJECT AREA MAPS FOR DESIGNATING WATER QUALITY PROTECTION NEEDS

Project area maps will be developed during the project preparation process. These maps identify streamcourses and meadows to protect, as well as project boundaries, specified roads, road use restrictions, structural improvements to protect, fuels and vegetation management methods, water sources, and other relevant features required to implement the project. This BMP will be used for the entire area. (Planning Forester, Fuels Specialist, Project Preparation Personnel, Wildlife Biologist- During Project Prep)

1.5 LIMITING THE OPERATING PERIOD OF RESOURCE MANAGEMENT ACTIVITIES

The timing of project operations, including operating areas and erosion prevention and control, are controlled by the project implementation plan or by contract provisions requiring an operating plan and schedule. Contact provisions limiting the operating period for mechanical treatment will be added to restrict operations in units which have less than 4 inches of dry soil (BMP 5.6) or because of wet conditions. This BMP applies to all project units. (Prep Forester - During Project Prep)

1.8 RIPARIAN CONSERVATION AREA DESIGNATION

Management in Riparian Conservation Areas (RCAs) needs to be consistent with Riparian Conservation Objectives (RCOs) and Aquatic Management Strategy (AMS) goals. The intent of management direction for RCAs is to (1) preserve, enhance, and restore habitat for riparian- and aquatic-dependent species; (2) ensure that water quality is maintained or restored; (3) enhance habitat conservation for species associated with the transition zone between upslope and riparian areas; and (4) provide greater connectivity within the watershed. Projects that propose activities in RCAs need to enhance or maintain the physical and biological characteristics of the RCA.

All associated Standards and Guidelines identified in the Tahoe National Forest Land and Resource Management Plan (Forest Plan) associated with this project will be adhered to.

The following are guidelines for establishing RCA widths (measured each side of stream from the apparent high-water mark or the edge of the special aquatic feature) along with equipment restrictions, vegetation management requirements, and prescribed fire requirements:

**Riparian Conservation Area Widths**

Widths of RCAs vary with the type of water body. The types of water bodies are designated as follows: (1) perennial streams; (2) seasonally flowing streams (includes ephemerals with defined stream channel or evidence of scour); (3) streams in inner gorge; (4) special aquatic features (lakes, meadows, bogs, fens, wetlands, vernal pools, and springs); and (5) other hydrologic or topographic depressions without a defined channel. The Sierra Nevada Forest Plan Amendment ROD defines the widths of the

RCAs as follows:

| Stream Type | Width of the Riparian Conservation Area |
|---|---|
| **Perennial Streams** | 300 feet each side, measured from bank full edge |
| **Seasonal Flowing Streams** | 150 feet each side, measured from bank full edge |
| **Streams In Inner Gorge** | Top of inner gorge if beyond 300 feet* |
| **Special Aquatic Features: Meadows, Lakes, and Spring** | 300 feet from edge of feature or riparian vegetation, whichever is greater |

*Note: If inner gorge is present and extends beyond specified RCA width, the RCA width will extend to the top of the inner gorge. The inner gorge area is defined as slopes adjacent to the stream channel greater than 70% gradient.

Other hydrologic or topographic depressions without a defined channel will be protected through standard operating procedures during unit layout through administration of the contract.

**Riparian Buffers**

Riparian buffers will be established within all RCAs. The purpose of the riparian buffer is to minimize impacts from management activities to the stream-adjacent zone and riparian habitat. The following are specified widths of the riparian buffer related to stream types:

Perennial Streams and Special Aquatic Features

-100 feet slope distance from the edge of the existing riparian vegetation.

Seasonal Streams (intermittent and ephemeral)

- Intermittent streams: 50 feet slope distance from the edge of the existing riparian vegetation or, if no riparian vegetation exists, from the apparent high water mark.

- Ephemeral streams: 25 feet from stream channel.

**Equipment Restrictions**

**High-ground-pressure equipment** (tractors, skidders, etc.) is limited to slopes less than 20% gradient within the RCA. New skid trails, landings or roads would not be constructed within any RCA without direct consultation with a riparian specialist. High-ground-pressure equipment is restricted to existing skid trails, landings, and roads within RCAs except to retrieve tree bundles. Consult with a riparian specialist on use of existing facilities. Within RCAs having slopes < 20% and outside of the riparian buffer, rubber-tired skidders may enter to retrieve tree bundles but are limited to 1-2 passes over the same piece of ground. Use of skidding equipment within RCAs must be reviewed on-the-ground by a riparian specialist. Skid trails would be located outside of the RCA. Endlining within the RCA, outside of the riparian buffer must be approved prior to the activity by a riparian specialist. Designated skid trails crossing

ephemeral stream channels may be approved for access to otherwise inaccessible areas, but only upon consultation with a riparian specialist. **Note**: to keep skid trails outside RCA during harvest operations, document on harvest cards if entering RCAs with high-ground-pressure equipment to retrieve tree bundles.

Mechanical piling for fuels reduction may occur within RCAs, outside of the designated riparian buffer, when such operations do not result in detrimental soil compaction and meets the slope, soil moisture, and minimum effective soil cover (ESC) requirements.

Low-ground-pressure equipment (feller buncher, excavator, etc.) is limited to slopes less than 20% gradient within the RCA. No equipment is permitted within the riparian buffer except on approved designated skid trails or on existing skid trails, landings, or roads. Consult with a riparian specialist on use of existing facilities.

Helicopter operations may occur within the RCA outside of the identified riparian buffer. Helicopter operations within the riparian buffer may be considered on a site-specific basis after consultation with a riparian specialist.

Skyline operations may occur within the RCA when full suspension is achieved throughout the riparian buffer.

**Vegetation Management Requirements**

Perennial Streams and Special Aquatic Features - Unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within the 100-foot riparian buffer. Low-ground-pressure equipment, which can achieve vegetation and fuels treatments with little ground disturbance, are allowed within the RCA outside the riparian buffer on slopes < 20% gradient. High-ground-pressure equipment may enter the RCA if conditions under "Equipment Restrictions" are met.

Seasonal Streams – Within intermittent stream RCAs, unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within the 50-foot riparian buffer. Low-ground-pressure equipment, which can achieve vegetation and fuels treatments with little ground disturbance, are allowed within the RCA outside the riparian buffer on slopes < 20% gradient. High-ground-pressure equipment may enter the RCA if conditions under "Equipment Restrictions" are met.

Within **ephemeral** stream RCAs, vegetation and fuels management activities using low-ground-pressure equipment may occur in the RCA on slopes < 20% gradient. No equipment is permitted within the 25-foot riparian buffer except on approved designated skid trails or on existing skid trails, landings, or roads and only after consultation with a riparian specialist. Harvest may occur within the riparian buffer if material can be fully suspended. Do not harvest trees within the stream channel or trees providing bank stability.

**Prescribed Fire Requirements**

Perennial Streams and Special Aquatic Features – "design prescribed fire treatments to minimize disturbance of ground cover and riparian vegetation in RCAs...identify mitigation measures to minimize the spread of fire into riparian vegetation." (Sierra Nevada Forest Plan Amendment – Record of Decision, Appendix A-56). The minimum effective soil cover (ESC) requirements are identified in the Tahoe National Forest Land and Resource Management Plan (Forest Plan) on page V-37. To minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within the riparian buffer. Fire may back into the riparian buffer. No pile burning will occur within the 100-foot riparian buffer. The riparian buffer may vary in width if needed to achieve fuels or resource protection objectives upon field review by resource specialists. Burning prescriptions should be developed to retain ESC, coarse large woody debris (CWD), and standing snags throughout the RCA. Short-term reduction of CWD below soil quality standards, or standards in species management plans, may occur within strategically placed treatment areas (SPLATS) or the wildland urban intermix (WUI) zone.

Seasonal Streams - The minimum effective soil cover (ESC) requirements are identified in the Forest Plan on page V-37. To minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within a minimum 50-foot slope distance from the edge of the existing riparian vegetation of intermittent streams. Fire may back into these riparian buffers. No pile burning would occur within the respective riparian buffers. Buffers may vary in width if needed to achieve fuels or resource protection objectives upon field review by resource specialists. Burning prescriptions should be developed to retain CWD; however, a reduction of CWD below soil quality standards or standards in species management plans may occur within SPLATS or the urban wildland intermix zone. Within ephemeral stream RCAs, do not ignite within the stream channel. Pile burning may take place within ephemeral RCAs as long as piles are not placed within the stream channel. (Hydrologist, Planning Forester, Fuels Specialist - During environmental analysis process; Prep Forester, Fuels Specialist - During Project Prep; Fuels Specialist - During Site Preparation)

1.9 DETERMINING SLOPE LIMITATIONS FOR EQUIPMENT

Outside of RCA boundaries, tractors and other ground-based equipment will be allowed where slopes are generally less than 25 percent. Within RCA boundaries, ground-based equipment may be allowed if conditions in BMP 1.8 under "Equipment Restrictions" are met. This BMP applies to all units. (Planning Forester - During environmental analysis process; Prep Forester - During Project Prep)

1.10 TRACTOR SKIDDING DESIGN

Skid trails need to be designed to minimize the sediment yield potential of the units. Timber Sale Contract (TSC) provision C6.422 (Tractor Skidding Requirements), or the equivalent, is required on all units. The volume and velocity of runoff water will be modified to minimize erosion and sedimentation. This may involve designating and flagging skid trails, endlining, and/or falling to the lead. TSC provisions B6.42,

B6.422, and C6.424, or the equivalent, will be used to control skidding and yarding, and landing and skid trail locations. No new skid trails or roads will be constructed within RCAs without direct consultation with a riparian specialist. Designated skid trails crossing ephemeral stream channels may be approved for access to otherwise inaccessible areas, but only upon consultation with a riparian specialist. This BMP applies to all tractor units. (Planning Forester, Soil Scientist, Hydrologist - During environmental analysis process; Prep Forester - During Project Prep)

1.11 SUSPENDED LOG YARDING IN TIMBER HARVESTING

To protect soil from excessive disturbance and maintain integrity of the RCA, areas within the designated RCA and on slopes generally over 25 percent outside of RCAs, logs would be suspended either partially (outside of riparian buffer) or completely off the ground (inside riparian buffer). Yarding systems would include either helicopter or skyline yarders. The Timber Sale Administrator shall oversee the project operation using guidelines and standards established in the TSC, such as, TSC provisions C6.427 (Skyline Yarding) and/or C6.429 (Helicopter Yarding). This BMP applies to all skyline and helicopter units. (Planning Forester, Soil Scientist, Hydrologist - During EA Process; Prep Forester - During Sale Prep)

1.12 LOG LANDING LOCATION

Landings will be located according to TSC provision B6.422. They will be located to avoid wetlands, unstable lands, and RCAs. The cleared or excavated size of landings will not exceed that needed for safe and efficient operations. Sites will be selected which involve the least excavation and soil erosion potential. Where possible, landings will be located on or near ridges and where skidding across drainages is minimized. They will be located where sidecast will neither enter drainages nor damage other sensitive areas. Existing landings may be used within RCAs when agreed to by a riparian specialist. The BMP applies to all units. (Prep Forester - During Project Prep; Sale Administrator (SA)/Contracting Officer's Representative (COR) - During Administration of the Project)

1.13 EROSION PREVENTION AND CONTROL MEASURES DURING TIMBER SALE OPERATIONS

All erosion control work shall be completed within 15 days of completion of skidding operations relating to each landing or within 15 days of the Contract Administrator's on-the-ground designation of erosion prevention measures. The provision also requires that erosion control work be completed as promptly as possible after September 15. TSC provision B6.6 and C6.6, or the equivalent, are required in all contracts. This BMP applies to all units. (SA/COR - During Administraiton of the Project)

1.14 SPECIAL EROSION PREVENTION MEASURES ON DISTURBED LAND

The contractor shall spread slash on tractor roads, skid trails, landings or temporary road fills as provided for in TSC B6.6, C6.6, and C6.602. (SA/COR - During Administration of the Project)

1.16 LOG LANDING EROSION PREVENTION AND CONTROL
All landings will be ditched and outsloped for proper drainage according to TSC provision B6.63. Provision C6.603, or the equivalent, will be implemented to deep till as appropriate. (SA/COR - During Administration of the Project)

1.17 EROSION CONTROL ON SKID TRAILS
Erosion control measures on skid trails and temporary roads will be completed by the contractor immediately after tree removal or prior to seasonal shut down. Cross ditches, water spreading devices, or backblading shall be agreed to by the Contract Administrator. These measures shall comply with FSH 2409.15 Secs. 61.64 and 61.65 which provide guidelines for spacing cross drains, construction techniques, and cross drain angles and heights. In addition to the above, skid trails on soils with EHRs of "very high", will be stabilized according to TSC provision C6.601 or C6.602 (see BMPs 1.14 and 1.15). This BMP applies to all mechanically treated units. (SA/COR - During Administration of the Project)

1.18 MEADOW PROTECTION DURING HARVESTING, SITE PREP, AND MASTICATION
Meadow buffer boundaries will be posted on the ground. Guidelines for activities within RCAs are presented in BMP 1.8 which outlines equipment restrictions, vegetation management requirements, and prescribed fire requirements. TSC provisions B6.61, C6.61 and C6.62, or the equivalent, will be implemented for meadow protection and for repair of damages due to unauthorized entry. For meadow protection during the Aspen restoration activities, conifer yarding would be accomplished by helicopter. (Hydrologist, Prep Forester - During Sale Prep, SA/COR - During Administration of the Project)

1.19 STREAMCOURSE PROTECTION
Guidelines for activities within RCAs are presented in BMP 1.8 which outlines equipment restrictions, vegetation management requirements, and prescribed fire requirements. TSC provisions B6.5, B6.6, C6.427, C6.5, and C6.6, or the equivalent, will be implemented for streamcourse protection. These provisions cover proper location and methods of streamcourse crossings, equipment exclusion zones, endlining, erosion control needs near channels, and removal of material from temporary crossings. This BMP must be consistent with BMPs 1.8 and 5.3. This BMP applies to all units having a designated RCA. (SA/COR - During Administration of the Project)

1.20 EROSION CONTROL STRUCTURE MAINTENANCE
TSC provisions B4.225, B6.6, and B6.66, or the equivalent, are required to ensure that constructed erosion control structures are stabilized and working. During the period of the contract, the contractor shall provide maintenance to ensure erosion control structure stability for up to one year following their construction. The Forest Service may agree to perform such maintenance, if requested by the contractor, subject to agreement on rates. If the contractor fails to do seasonal maintenance work, the Forest

Service may assume the responsibility and charge the contractor accordingly. This BMP applies to all units. (SA/COR - During Administration of the Project)

1.21 ACCEPTANCE OF TIMBER SALE EROSION CONTROL MEASURES BEFORE SALE CLOSURE

TSC provisions B6.6, B6.62, B6.63, B6.64, B6.65, B6.66, and C6.6, or the equivalent, specify erosion prevention and control measures, and maintenance of such measures, for landings, skid trails, firelines, etc. Planned erosion control work will be inspected prior to project completion to determine whether the work will be approved as adequate, if maintenance work is needed, the practicality of treatments, and the necessity for modifying standards.

Erosion control work will be approved as acceptable if there is only minor deviation from standards, provided no major or lasting damage is caused to soil or water. Erosion control work which fails to meet this criteria will not be accepted and will be redone to accepted standards. This BMP applies to all units. (SA - During Administration of the Project)

1.22 SLASH TREATMENT IN SENSITIVE AREAS

Units which include RCAs for perennial and intermittent streamcourses or meadows must meet effective soil cover goals stated in the standard and guidelines of the Forest Plan. Within sensitive areas (including the Aspen restoration areas), slash treatments would include hand pile and burn, lop and scatter, and hand pile and leave to create cover piles for small mammals. Fuels treatment within RCAs, including the use of heavy equipment, must meet effective soil cover goals in RCAs, or unit-wide (if applicable). This BMP applies to all units. (Prep Forester, Fuels Specialist - During Project Prep; SA/COR - During Administration of the Project)

1.24 NON-RECURRING C-PROVISIONS

Contract provisions will be developed as needed to ensure that adequate soil, water, or watershed values are protected as part of the project contract. (Prep Forester, Hydologist, Soil Scientist - During Planning Process; Prep Forester - during Contract Preparation)

1.25 MODIFICATION OF THE PROJECT CONTRACT

Contract provisions will be included which allow for contract modification if new circumstances indicate the project will irreversibly damage soil, water, or watershed values. The project modification can be accomplished by agreement with the contractor, or unilaterally by the Forest Service (with suitable compensation to the contractor) using an amended environmental document prepared by an ID Team. (SA/COR - During Administration of the Project)

2.7 CONTROL OF ROAD DRAINAGE

All waterbars and/or dips will be spaced to allow adequate drainage off of road surfaces and minimize water flow down roads. Outlets will be rip-rapped, if needed.

(Design Engineer - During road design; ER - During Road Construction; SA/COR - During Administration of the Project)

2.12 SERVICING AND REFUELING OF EQUIPMENT

To prevent pollutants such as fuels, lubricants, and other harmful materials from being discharged into watercourses or into natural channels leading thereto, unless otherwise agreed by the hydrologist, service and refueling areas shall be located outside of RCAs. In case of a hazmat spill, the material shall be immediately contained and the Forest Service shall be immediately notified. (SA/COR, hydrologist - During Administration of the Project)

2.16 STREAMCROSSINGS ON TEMPORARY ROADS

No new specified or temporary roads would be constructed within any perennial or intermittent RCA. Temporary roads may be constructed in ephemeral RCAs, but only after consultation with a riparian specialist. Consult with a riparian specialist on use of existing roads within the RCA. This BMP applies to designated streams with RCAs. (SA/COR, hydrologist - During Administration of the Project)

2.21 WATER SOURCE DEVELOPMENT CONSISTENT WITH WATER QUALITY PROTECTION

Water sources will be designed to minimize streamflow fluctuation, maintain water quality and protect fish habitat while providing water for abating dust on roads during log hauling. At no time shall downstream flow be reduced to a level detrimental to aquatic resources, fish passage or other beneficial uses as outlined in Appendix F of the TNF LRMP. Water supplies shall be developed in consultation with the hydrologist or fish biologist. Refer to TSC provision C5.451. (SA/COR, hydrologist or fish biologist - During Administration of the Project)

2.22 MAINTENANCE OF ROADS

The road system will be inspected prior to the operating season, problem areas will be identified and corrected. The Forest Service and contractor will agree on an annual Road Maintenance Plan. This BMP applies to all roads used for the project. (Operation and Maintenance (O&M) Engineer - During Administration of the Project and annually thereafter)

2.23 ROAD SURFACE TREATMENT TO PREVENT LOSS OF MATERIALS

Road surfaces will be treated with water, MgCl, or lignin sulfonate, depending on use, soils, and availability of water. (O&M Engineer - During Product Hauling)

2.24 TRAFFIC CONTROL DURING WET PERIODS

Use on all native surface roads will be restricted to the dry season when roads are stable. A Wet Weather/Winter Operating Agreement should be agreed upon prior to operating during wet periods. (O&M Engineer - During Administration of the Project)

5.3 EQUIPMENT OPERATION RESTRICTED WITHIN RIPARIAN CONSERVATION AREAS AND MEADOWS

Fuels and vegetation management activities using high-ground-pressure equipment are restricted within RCAs. Guidelines for activities within RCAs are presented in BMP 1.8 which outlines equipment restrictions, vegetation management requirements, and prescribed fire requirements. Provisions in the contract would be implemented for RCAs and meadow protection and for repair of damage due to unauthorized entry. If new streamcourses and meadows are located during the planning process, the hydrologist would be notified and would inspect locations to determine RCA widths and associated guidelines. (Hydrologist-During Project Contract Prep; SA/COR - During Administration of the Project)

5.6 SOIL MOISTURE LIMITATIONS FOR MECHANICAL EQUIPMENT OPERATIONS

Equipment activities will be allowed only when soil moisture conditions are such that compaction, gullying, and/or rutting will be minimal. In general, low-ground-pressure equipment may operate when soils are dry to a depth of 4 inches. High-ground-pressure equipment may operate on designated skid trails when soils are dry to a minimum depth of 4 inches. High-ground-pressure equipment may operate off of designated skid trails when soils are dry to a minimum depth of 8 inches. Winter operations will be allowed as long as a wet weather/winter operations agreement is agreed to prior to operations. For unclear situations, or in the event of a difference of opinion between the Forest Service Representative and Contractor's Representative, a hydrologist/soil scientist must be consulted. (Planning Forester, Soil Scientist - During environmental analysis process; SA/COR, hydrologist/soil scientist - During Administration of the Project)

6.1 FIRE AND FUEL MANAGEMENT ACTIVITIES

Fuel management activities were developed with the objective of reducing the probability that wildfires will result in catastrophic watershed damage. Catastrophic watershed damage is defined as a watershed condition with a high probability of producing flooding, erosion that will exceed water quality standards established for identified beneficial uses, or loss of riparian vegetation that will increase stream temperatures. Most of these conditions can be avoided by reducing the intensity of wildfires and fires that are prescribed for slash treatment. (Fuels Specialist - During environmental analysis process)

6.2 CONSIDERATION OF WATER QUALITY IN FORMULATING FIRE PRESCRIPTIONS

Provide for water quality protection while achieving the management objectives through the use of prescribed fire. Prescription elements will include, but are not limited to, such factors as fire weather, slope, aspect, soil moisture, and fuel moisture. These elements influence the fire intensity and thus have a direct effect on meeting the desired ground- cover requirements. Guidelines for prescribed fire activities within RCAs are presented in BMP 1.8. Direct ignition will take place outside designated riparian buffers. Fire may back into the riparian buffers. Both the optimum and

allowable limits for the burn to ensure water quality protection will be established prior to preparation of the burn plan. Effects of prescribed fire within the RCA will be assessed and mitigation measures, such as mulching or lop and scatter of existing vegetation, may be prescribed for the specific RCA. (Fuels Specialist and Riparian Specialists - During environmental analysis process and fuels treatment activities)

6.3 PROTECTION OF WATER QUALITY FROM PRESCRIBED BURNING EFFECTS

To maintain soil productivity, minimize erosion, and prevent ash, sediment, and nutrients from entering water bodies: (1) construct waterbars in fire lines; (2) burn within prescription to avoid intense fires, which may promote hydrophobicity, nutrient leaching, and erosion; (3) keep accurate records of site conditions (pre- and post-fire site condition data); (4) retain or plan for sufficient ground cover to prevent erosion of the burned site. (Fuels Specialist - During Fuels Treatment)

7.8 CUMULATIVE OFF-SITE WATERSHED EFFECTS

A cumulative watershed effects (CWE) analysis was done as part of the environmental analysis and the results are documented in the Environmental Consequences chapter of this EA. (Hydrologist - During environmental analysis process)

**Comparison of Alternatives-** The following charts compare the alternatives in terms of the actions they propose as well as their potential environmental consequences.

**Acres and Treatment by Unit Charts:**

**Table 2-2. Fuels Treatments Summary-**

| Unit Number | Estimated Unit Acres – Alt A | Estimated Unit Acres – Alt B | Estimated Unit Acres – Alt C | Estimated Unit Acres – Alt D | Proposed Treatment | SNFPA Land Allocation | Primary Purpose for Treatment |
|---|---|---|---|---|---|---|---|
| **A** | 210 | 0 | 210 | 210 | Handcut/ Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **B** | 138 | 0 | 138 | 138 | Underburn | Threat Zone | Fuels Reduction/Wildlife |
| **C** | 67 | 0 | 67 | 67 | Mastication | Threat Zone | Fuels Reduction |
| **D** | 169 | 0 | 169 | 169 | Handcut/ Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **E** | 165 | 0 | 165 | 165 | Handcut/ Tractor Pile | Threat Zone/HRCA | Fuels Reduction |
| **F** | 271 | 0 | 271 | 271 | Underburn | Threat Zone | Fuels Reduction/Wildlife |
| **G** | 34 | 0 | 34 | 34 | Underburn | Threat Zone | Fuels Reduction/Wildlife |
| **H** | 94 | 0 | 94 | 94 | Underburn | Defense Zone | Fuels Reduction/Wildlife |
| **I** | 136 | 0 | 136 | 136 | Underburn | PAC/Threat Zone/HRCA | Fuels Reduction/Wildlife |
| **J** | 25 | 0 | 25 | 25 | Handcut/ Tractor Pile | Threat Zone | Fuels Reduction |
| **K** | 65 | 0 | 65 | 65 | Handcut/ Hand Pile | Threat Zone/PAC | Fuels Reduction |
| **N** | 35 | 0 | 35 | 35 | Handcut/ Tractor Pile | HRCA | Fuels Reduction |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **O** | 14 | 0 | 14 | 14 | Handcut/ Tractor Pile | Threat Zone | Fuels Reduction |
| **P** | 4 | 0 | 4 | 4 | Handcut/ Tractor Pile | Threat Zone | Fuels Reduction |
| **Total** | **1,427** | **0** | **1,427** | **1,427** | | | |

**Table 2-3. Mechanical Thinning Treatments Summary.**

| Unit Number | Estimated Unit Acres (Thinning Only)- Alt. A | Estimated Unit Acres (Thinning Only)- Alt. B | Estimated Unit Acres (Thinning Only)- Alt. C | Estimated Unit Acres (Thinning Only)- Alt. D | Proposed Harvest System | SNFPA Land Allocation | Primary Purpose for Treatment |
|---|---|---|---|---|---|---|---|
| **1** | 12 | 0 | 12 | 0 | Aerial | Threat Zone | Wildlife[1]/Forest Health |
| **2** | 9 | 0 | 9 | 0 | Aerial | Threat Zone | Wildlife[1]/Forest Health |
| **3** | 29 | 0 | 29 | 0 | Aerial | Threat Zone | Wildlife[1]/Forest Health |
| **4** | 7 | 0 | 7 | 0 | Ground | HRCA | Wildlife[1]/Forest Health |
| **5** | 28 | 0 | 28 | 0 | Aerial | HRCA | Wildlife[2]/Forest Health |
| **6** | 6 | 0 | 6 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health |
| **8** | 17 | 0 | 17 | 0 | Aerial | Threat Zone | Wildlife[3]/Forest Health |
| **10** | 103 | 0 | 103 | 0 | Ground | Threat Zone/ HRCA | Wildlife[2]/Forest Health/Fuels Reduction |
| **11** | 39 | 0 | 39 | 0 | Aerial | Threat Zone | Wildlife[1]/Forest Health |
| **13** | 5 | 0 | 0 | 0 | Aerial | HRCA | Wildlife[3]/Forest Health |
| **14** | 27 | 0 | 27 | 0 | Ground | Threat Zone | Forest Health/Fuels Reduction |
| **15** | 42 | 0 | 42 | 0 | Aerial | Threat Zone/ HRCA | Wildlife[1]/Forest Health |
| **16** | 30 | 0 | 30 | 0 | Aerial | Threat Zone | Wildlife[3]/Forest Health |
| **17** | 13 | 0 | 0 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health |
| **18** | 32 | 0 | 32 | 0 | Aerial | Threat Zone | Wildlife[3]/Forest Health |
| **19** | 17 | 0 | 17 | 0 | Aerial | HRCA | Wildlife[3]/Forest Health/Fuels Reduction |
| **21** | 14 | 0 | 14 | 0 | Ground | Defense Zone/ HRCA | Forest Health/Fuels Reduction |
| **23** | 76 | 0 | 76 | 0 | Aerial | Defense Zone | Wildlife[3]/Forest Health |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **24** | 18 | 0 | 18 | 0 | Aerial | HRCA | Forest Health/Fuels Reduction |
| **27** | 110 | 0 | 110 | 0 | Ground | HRCA | Wildlife[3]/Forest Health/Fuels Reduction |
| **30** | 35 | 0 | 35 | 0 | Ground | HRCA | Wildlife[3]/Forest Health/Fuels Reduction |
| **31** | 14 | 0 | 14 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health/Fuels Reduction |
| **32** | 12 | 0 | 12 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health/Fuels Reduction |
| **33** | 28 | 0 | 28 | 0 | Aerial | Threat Zone | Wildlife☼/Forest Health/Fuels Reduction |
| **34** | 21 | 0 | 21 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health/Fuels Reduction |
| **35** | 16 | 0 | 0 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health/Fuels Reduction |
| **36** | 33 | 0 | 0 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health |
| **37** | 34 | 0 | 0 | 0 | Aerial | Threat Zone | Wildlife[3]/Forest Health |
| **38** | 62 | 0 | 0 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health/Fuels Reduction |
| **39** | 4 | 0 | 4 | 0 | Ground | Threat Zone | Wildlife[3]/Forest Health/Fuels Reduction |
| **42** | 47 | 0 | 47 | 0 | Aerial | Threat Zone | Wildlife[3]/Forest Health/Fuels Reduction |
| **Total** | **940** | **0** | **799** | **0** | | | |

Wildlife[1]-oak enhancement
Wildlife[2]-pine enhancement
Wildlife[3]-structural diversity

**Table 2-4. Aspen Restoration Treatments Summary.**

| Unit Number | Estimated Unit Acres Alt. A | Estimated Unit Acres Alt. B | Estimated Unit Acres Alt. C | Estimated Unit Acres Alt. D | Proposed Harvest System | SNFPA Land Allocation | Primary Purpose for Treatment |
|---|---|---|---|---|---|---|---|
| **50** | 4 | 0 | 4 | 0 | Helicopter | Threat Zone | Wildlife☼ |
| **51** | 3 | 0 | 3 | 0 | Helicopter | Threat Zone | Wildlife☼ |
| **52** | 4 | 0 | 4 | 0 | Helicopter | Threat Zone | Wildlife☼ |
| **53** | 9 | 0 | 9 | 0 | Helicopter | Threat Zone | Wildlife☼ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **54** | 1 | 0 | 1 | 0 | Helicopter | Threat Zone | Wildlife☼ |
| **55** | 1 | 0 | 1 | 0 | Helicopter | Threat Zone | Wildlife☼ |
| **Total** | **22** | **0** | **22** | **0** | | | |

**Table 2-5. Attributes Comparison Chart:**

| **Attribute Compared** | **Alternative A- (Proposed Action)** | **Alternative B- (No Action)** | **Alternative C- (2001 Framework)** | **Alternative D- (Noncommercial Funding Alternative)** |
|---|---|---|---|---|
| **Acres of reduced fuels, by treatment type.** | | | | |
| **Underburn:** | 673 acres | None | 673 acres | 673 acres |
| **Masticate:** | 67 acres | None | 67 acres | 67 acres |
| **Hand Thin/Hand Pile/Burn:** | 65 acres | None | 65 acres | None |
| **Hand Thin/Tractor Pile/Burn:** | 621 acres | None | 621 acres | None |
| **Mechanical Thin (**Includes Precomm. Thin**):** | 982 acres | None | 799 acres | None |
| **Precommercial Thin:** | 42 acres | None | 42 acres | None |
| (****Note**: Some acres overlap, therefore, totals do not match cumulative column totals; and all acres are approximate) | | | | |
| **Total Acres:** | **2,400 Acres**** | **None** | **2,230 Acres**** | **1,360 Acres** |
| **Acres of treatments in developed areas within the Urban Wildland Intermix Zone (Defense or Threat).** | Approximately 1,750 acres treated in WUI. | No treatments would be accomplished. | Approximately 1,560 acres treated in WUI. | Approximately 1,325 acres treated in WUI. |

| Attribute Compared | Alternative A- (Proposed Action) | Alternative B- (No Action) | Alternative C- (2001 Framework) | Alternative D- (Noncommercial Funding Alternative) |
|---|---|---|---|---|
| **Minimum post-harvest canopy closure on mechanically thinned acres (outside defense zones).** | 40% minimum. | Existing. | 50% minimum | Existing. |
| **Treatment of materials in thinned units 10" dbh and less.** | 795 acres | None | 795 acres | None |
| **Acres where trees >20 inches dbh, but <30 inches dbh may be removed (excluding aspen stands and hazard trees).** | 599 acres | None | 76 acres | None |
| **Miles of Roads planned for closing/ decommissioning.** | 5.1 miles | None | 5.1 Miles | None |
| **Meets 2001 – Original SNFPA** | No | N/A | Yes | Yes |
| **Meets 2004 – Supplemental SNFPA** | Yes | N/A | No | Yes |
| **Improvement of Forest and Watershed Health** | Yes | No | Yes, but less than Alt. A | No |

| Attribute Compared | Alternative A- (Proposed Action) | Alternative B- (No Action) | Alternative C- (2001 Framework) | Alternative D- (Noncommercial Funding Alternative) |
|---|---|---|---|---|
| **Amount of Timber harvested.** | 7.6 mmbf | None | 3.3 mmbf | None |
| **Amount of money generated to fund improvement projects within Sale Area (ie. wildlife enhancement, watershed improvement, Fuels reduction)** | $391,400 | None | $33,275 | None |

****Note**: All acres are approximate.

**Table 2-6. Treatment Comparison Chart:**

| Action Proposed | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| **Masticate small conifers and shrubs** | 67 acres | None | 67 acres | 67 acres |
| **Hand thin/tractor pile** | 621 acres | None | 621 acres | 621 acres |
| **Mastication** | 67 acres | None | 67 acres | 67 acres |
| **Hand thin/hand pile** | 65 acres | None | 65 acres | None |
| **Underburning** | 673 acres | None | 673 acres | 673 acres |

| Action Proposed | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| **Thin/ground-based equipment** | 477 acres | None | 353 acres | None |
| **Thin/aerial-based equipment** | 463 acres | None | 424 acres | None |
| **Precommercial Thinning** | 42 acres | None | 42 acres | None |
| **Conifers Planted with Site Prep** | 60 acres | None | 60 acres | None |
| **Conifers Planted without Site Prep** | 73 acres | None | 73 acres | None |
| **Bear Grass Enhancement/ Regeneration** | 1 acre | None | 1 acre | None |
| **Aspen Stand Restoration** | 22 acres | None | 22 acres | None |
| **Enhancement of hardwoods (Oaks)** | Yes | None | Yes, but less than Alt. A | None |
| **Improve cover for smaller animals and prey species** | 240 acres | None | 230 acres | None |
| **Treat cut stumps with borate compound** | Yes | No | Yes | No |
| **Offer sawtimber and biomass material** | Yes | No | Yes | No |
| **ID and remove hazardous trees along roads within units** | Yes | No | Yes | No |
| **Reconstruct specified roads** | 1 mile | None | 1 mile | None |

| Action Proposed | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| **Close or decommission unnecessary roads** | 5.1 miles | None | 5.1 miles | None |

****Note**: All acres are approximate.

**Table 2-7. Comparison of Potential Environmental Impacts of the Gold Project Alternatives.**

| Resources of Interest | Alternative A (Proposed Action) | Alternative B (No Action) | Alternative C (2001 SNFPA) | Alternative D (Non-Commercial Funding) |
|---|---|---|---|---|
| **Cumulative Watershed Effects** | 4 watersheds at low risk of adverse cumulative watershed effects | 4 watersheds at low risk of adverse cumulative watershed effects | 4 watersheds at low risk of adverse cumulative watershed effects | 4 watersheds at low risk of adverse cumulative watershed effects |
| **Perennial, Intermittent, and Meadow Riparian Conservation Areas (RCAs) Affected** | Ground-based mechanical thinning operations proposed on 8 acres in RCAs | No ground-based mechanical thinning operations proposed in RCAs | Ground-based mechanical thinning operations proposed on 8 acres in RCAs | No ground-based mechanical thinning operations proposed in RCAs |
| **Percentage Crown Fire Potential Reduced in Thinning Units** | 45% reduction | No mechanical thinning proposed | No reduction | No mechanical thinning proposed |
| **Forest Health – acres meeting SDI goals post-treatment** | 517 acres | 86 acres | 146 acres | 100 acres |
| **Habitat Removed for Old Forest Associated Species** | None. | None. | None. | None. |

| Resources of Interest | Alternative A (Proposed Action) | Alternative B (No Action) | Alternative C (2001 SNFPA) | Alternative D (Non-Commercial Funding) |
|---|---|---|---|---|
| **Soil Compaction** | Detrimental compaction limited in degree and extent, primarily on landings and heavily used tractor skid trails | No detrimental compaction | Detrimental compaction limited in degree and extent, primarily on landings and heavily used tractor skid trails | No detrimental compaction expected. |
| **Prescriptions move stands toward late-successional characteristics** | Yes, 940 acres | None | Yes, 777 acres | None |
| **Degree to which structural diversity is achieved (within stand diversity).** | More than Alt C | None | Less than Alt A | None |

# Chapter III – Environmental Consequences

This chapter discloses the potential consequences or impacts of the alternatives described in Chapter II. Chapter III provides the scientific and analytical basis for the comparison of the environmental consequences of the alternatives summarized in Chapter II.

This format is somewhat of a departure from many previous environmental assessments, which described the consequences in depth by alternative for each resource area (i.e., botany, fisheries, fuels, range, vegetation, wildlife, etc). Previous environmental assessments were very lengthy and included information that was not relevant to the issues. This format displays a comparison of the consequences, and provides brief, yet sufficient, evidence and analysis to determine whether to prepare an environmental impact statement or a finding of no significant impact. The specialist's reports, mentioned and/or incorporated by reference in this document, contain detailed analysis of the consequences by alternatives. They are located in the project file and are available upon request.

**Effects relative to significant issues**

This section describes the effects of the alternatives in relation to significant issues. There was one significant issue identified through scoping comments for this project: the potential impacts of removing trees between 20 and 30 inches dbh and reducing canopy cover on habitat for old forest associated species, particularly habitat for the California spotted owl. Commentors recommended fully analyzing an alternative that would implement direction from the 2001 SNFPA ROD to respond to this issue.

The proposed action (Alternative A) responds to the need to improve forest health, watershed health, and wildlife habitat, and to reduce surface fuel loadings and ladder fuels to a level that will allow safe fire suppression in the event of a wildfire, consistent with management direction in *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Amendment* (2004).

Alternative B is the No Action alternative. This alternative does not implement any of the actions proposed. Forest vegetation would continue in its current condition and trend. Fuels would only be modified through wildfires.

Alternative C responds to the significant issue related to potential impacts on habitat for wildlife species associated with old forest conditions by proposing to implement management direction in the SNFPA ROD of 2001. This alternative drops several units originally proposed in Alternative A, and modifies the actions to meet the concerns brought forth through public scoping, while still meeting the Standards and Guidelines of the 2004 SNFPA ROD.

Alternative D was developed in response to Judge England's November 4, 2009 court order for Case 2:05-cv-00205-MCE-GGH, which requires analysis of a non-commercial funding alternative for Forest Service projects that include a hazardous fuels reduction objective.

Alternative D fully analyzes implementing only fuels reduction activities as presented in the purpose and need, and proposed action. No other actions would occur.

**Effects relative to Finding of No Significance Impact (FONSI) elements**.

In 1978, the Council on Environmental Quality published regulations for implementing the National Environmental Policy Act (NEPA). These regulations (40 CFR Parts 1500-1508) included a definition of "significant" as used in NEPA. The eleven elements of this definition are critical to reducing paperwork through use of a finding of no significant impact (FONSI) when an action would not have a significant effect on the human environment, and is therefore exempt from requirements to prepare an environmental impact statement (EIS). Significance as used in NEPA requires considerations of context and the ten elements of intensity as follows:

**(a) Context: Significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, affected interests, and the locality. Significance varies with setting. In the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.**

The context of the proposed action is limited to minor, local, short-term effects within the area. No significant effects, either long or short term, regional or societal, are anticipated.

The local context of the proposed action is limited to the northwestern portion of the Tahoe National Forest, in locations shown on the attached maps (See Appendix A). The TNF is comprised of approximately 800,000 acres of national forest land. This project's area represents less than one percent of the total Forest landbase. Project activities would occur over a relatively short time period, with the mechanized portion of the harvest activities, in all probability, limited to a three year contract. Other project activities would, most likely, all be completed within five to seven years of the decision. Also, all these tasks are done seasonally, not year-round. Thus, in terms of the affected area, the proposed action affects a very small portion of the landbase over a relatively short timeframe. Even in the context of seasonality and duration of activities, analyses prepared in support of this EA (Biological Evaluations, Management Indicator Species Assessment, Weed Risk Assessment, Cumulative Watershed Effects Analysis, Riparian Conservation Objectives analysis, Riparian Conservation Area guidelines, fuels report, silvicultural report, and the soils analysis, hereby incorporated by reference, and available on request) indicate that the proposed action would not pose significant short- or long-term effects on forest resources.

**(b) <u>Intensity:</u> Refers to the severity of impact, ... and the following should be considered in evaluating intensity:**

**1. Impacts both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.**

Effects determinations are summarized in supporting analysis documents and/or in the remaining sections of this chapter. All analyses prepared in support of this document considered both beneficial and adverse effects, but all effects determinations were made on the basis of only adverse effects. The effects are discussed below.

## Soil Productivity:

The information provided in this section is summarized from the Soils Report prepared for the Gold Project (May 2010), which is hereby incorporated by reference. The complete Soils Report is available in the Gold Project Record.

The Tahoe National Forest Land and Resource Management Plan (LRMP 1990), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA 2004), provides direction for maintaining long-term soil productivity through standards and guidelines for three soil characteristics: soil porosity, soil cover, and soil organic matter (LRMP, pages V-36 through V-38). Existing soil conditions as well as direct and indirect effects of the alternatives on the three soil characteristics are addressed in here.

**Soil Cover (Erosion)**
The Pacific Southwest Region (R5) Soil Erosion Hazard Rating (EHR) System is used to rate the risk of soil erosion for all soils within the proposed activity areas (areas where soil disturbing activities are proposed). This system uses various physical soil properties, along with climate and site-specific conditions, to rate soils for hazard of sheet and rill erosion. Currently all proposed activity areas have a low risk of erosion. All activity areas reviewed currently have sufficient ground cover to prevent soil loss from erosion. No active erosion or sediment movement has been observed on any proposed activity areas surveyed that would indicate a loss in soil productivity.

**Soil Porosity (Compaction)**
Most of the proposed activity areas (95 percent) do not have a recent (less than 30 years) disturbance history. (Refer to the disturbance history map which shows the disturbance activity within the Gold Project Area.) Field observations of detrimental compaction on soils similar to the ones found in the proposed activity areas found less than 5 percent compaction in areas with a previous management history. Field observations of the Gold Project's activity areas found that the majority proposed for treatment do not have readily apparent detrimental compaction. All of the Gold Project's activity areas currently meet the Tahoe LRMP soil porosity standard.

**Soil Organic Matter**
Within the proposed activity areas, organic matter currently exists in kinds and amounts sufficient to prevent significant nutrient cycle deficits, and to avoid detrimental physical and biological soil conditions.

**Fine Organic Matter (Nutrient Cycling)**
Fine organic matter, including litter, duff, and woody material less than 3 inches diameter, currently occurs on greater than 90 percent of the proposed activity areas, and is on average 2 to 3 inches deep. In the project area, loss of soil organic matter is limited to old landings. Existing levels of fine organic matter are well within the LRMP standard for maintaining forest duff.

**Large Woody Material**
Existing levels of large woody material are consistent with the LRMP standard and guideline for maintaining large woody material.

Each of the action alternatives proposes varying types and levels of treatments. As these treatment prescriptions have differing effects on the soil resource, they are discussed individually below.

**Mechanical Thinning - Ground-based**

**Soil cover:** The use of a feller-buncher/skidder logging system would result in a temporary short-term reduction of ground cover on the skid trails and landings. Management requirements (detailed in Chapter II of this EA) include maintaining 50 to 60 percent effective soil cover in the activity areas. Forest monitoring has shown treated areas typically meet this effective soil cover requirement. This is acceptable to meet the LRMP standard for soil cover.

**Porosity:** Mechanical treatments have the potential to cause detrimental levels of compaction. When a load is applied to a body of soil, the soil compacts until it has enough strength to bear that load. As soil compacts, its porosity decreases and density increases. When soil porosity is lost because of compaction, less soil volume is available for roots to occupy and extract water and nutrients from. Less available rootable volume can thus equate to reduced plant growth. The effects of compaction on tree growth are well documented. On the Foresthill Divide on the Tahoe National Forest, Helms and Hipkin (1986) reported a 59 percent reduction in timber volume on soils with the highest amount of compaction. This study found that the volume of an average tree was 21 percent less on the most compacted soils when compared to the least compacted.

Soil compaction is of greatest concern in areas proposed for ground-based (tractor) logging. Detrimental levels of compaction are only anticipated where machine traffic is highly concentrated, such as landings and heavily used skid trails. The metasedimentary soils in the proposed activity areas have moderately low susceptibility to compaction due to the loam to sandy loam textures and high rock

fragment content. Because of the sandy loam and loam textures and coarse fragment content of the majority of soils in the proposed activity areas, the compaction caused by the project would have minimal effects on long-term soil productivity.

Based on past Forest-wide monitoring observations of ground-based mechanized tree removal operations, landings are expected to be ¼ to 1 acre in size and heavily compacted. Main skid trails used during the ground-based skidding would cover between 5 and 10 percent of the activity area and would be compacted to varying degrees. The skid trails would be more compacted and disturbed near the landing and less compacted and disturbed further from the landing. The main skid trails would be the most highly compacted. The density of skid trails would be higher near the landing where they converge. Secondary skid trails (trails that usually only receive one or two passes with skidding equipment) would cover an additional 10 to 15 percent of the area. Soil compaction and disturbance is usually slight to moderate on these trails.

Management requirements, including designating skid trails and skid trail spacing of 75 feet apart; lopping and scattering slash; limiting secondary skidding; limiting operations to when the soil is dry; subsoiling of temporary roads, landings and all skid trails within 100 feet of the landing; and re-using existing skid trails and landings (where possible) would limit reductions in soil porosity and potential impacts to long-term soil productivity. While some new detrimental compaction would occur within the proposed activity areas, these management requirements would minimize the potential for, and extent of, soil compaction. All activity areas are expected to meet the LRMP standard for soil porosity upon completion of project activities.

**Organic Matter:** As with soil cover, litter and duff would be removed from a small portion of the area, primarily on skid trails and landings. However, nutrient loss from mechanical ground-based thinning operations would be minimal as some limbs and treetops would remain on site. Thinning would promote vegetation growth, needle cast, and could create small openings for grass and nitrogen-fixing shrubs that could enrich the soil. Regrowth of biomass would bring the overall nutrient pool back to current levels in 10 to 20 years. In thinned areas, quantities of large woody material could be somewhat reduced; however, Forest monitoring of previous projects has shown that these areas meet LRMP standards for large woody material retention. Nutrient losses from the proposed mechanical ground-based thinning treatments would not adversely affect long-term soil productivity.

Alternatives B and D do not propose ground-based mechanical thinning treatments. Alternative A proposes more ground-based thinning treatment acreage (approximately 477 acres) compared to Alternative C (approximately 353 acres) so it would have a greater potential to reduce soil cover, soil porosity, and soil organic matter. However, for the reasons described in the preceding paragraphs, ground-based mechanical thinning treatments proposed under both Alternatives A and C would be expected to meet the LRMP standards for soil cover, soil porosity, and soil

organic matter. Mechanical thinning proposed under Alternatives A and C would have minimal effects on soil productivity, as described above.

**Mechanical Thinning - Aerial -based**

**Soil cover:** The direct effect of skyline yarding would be a temporary reduction of total soil cover on landings and in cable corridors. Helicopter yarding would temporarily reduce soil cover on landings, but would have a lesser effect on soil cover compared to sklyline yarding as it would not create cable corridors, Management requirements (detailed in Chapter II) call for retaining 60 percent effective soil cover in aerial thinning activity areas. Forest monitoring has shown treated units typically meet an effective soil cover requirement of 60 percent. This is acceptable to meet the LRMP standard for soil cover.

**Porosity:** Skyline logging would affect soil porosity primarily in the skyline corridors, temporary road alignments, and landings. The loss in porosity found in skyline corridors is usually more of surface sealing due to the dragging of the logs, not compaction due to loss of porosity deeper in the soil profile. Klock (1975) reported 25 percent disturbance caused by skyline logging, 22 percent slightly disturbed and 3 percent highly disturbed. While helicopter yarding would not create cable corridors, it would rely on temporary roads and landings,

Under the proposed action, landings and temporary roads compacted by harvest traffic would be subsoiled to restore soil porosity and further limit effects to long-term soil productivity. Since landings and temporary roads would be subsoiled and aerial yarding (both skyline and helicopter) does not cause compaction, the activity areas proposed for aerial yarding are expected to meet the LRMP standard for soil porosity.

**Organic Matter:** As with soil cover, in the case of skyline yarding, litter and duff would be removed from a small portion of the area, specifically in cable corridors. Landings associated with either skyline and helicopter operations would experience a reduction in organic matter. However, nutrient loss from mechanical aerial-based thinning operations would be minimal within the treated areas as some limbs and treetops would remain on site. Thinning would promote vegetation growth, needle cast, and could create small openings for grass and nitrogen-fixing shrubs that could enrich the soil. Regrowth of biomass would bring the overall nutrient pool back to current levels in 10 to 20 years. In thinned areas, quantities of large woody material could be somewhat reduced; however, Forest monitoring of previous projects has shown that these areas meet LRMP standards for large woody material retention. Nutrient losses from the proposed mechanical aerial-based thinning treatments would not adversely affect long-term soil productivity.

Alternatives B and D do not propose thinning treatments with aerial yarding. Alternative A proposes slightly more (approximately 463 acres) aerial-based thinning treatments compared to Alternative C (approximately 424 acres) so it would have a

greater potential to reduce soil cover, soil porosity, and soil organic matter. However, for the reasons described in the preceding paragraphs, aerial-based thinning treatments proposed under both Alternatives A and C would be expected to meet the LRMP standards for soil cover, soil porosity, and soil organic matter. Aerial-based thinning proposed under Alternatives A and C would have minimal effects on soil productivity, as described above.

**Hand Thinning, Tractor Piling, and Pile Burning.**

**Soil cover:** The direct effect of hand thinning, tractor piling, and pile burning treatments would be a temporary reduction of total soil cover in proposed activity areas. Cover would be eliminated in portions of activity areas where concentrations of fuels were burned. Monitoring of tractor piling on the Eldorado National Forest has shown that adequate effective soil cover for erosion protection would exist in the activity areas after treatment. The results would be consistent with the LRMP standard for soil cover.

Forest Service Handbook 2509.18 – Soil Management Handbook provides threshold values for soil properties and conditions to use as indicators of significant change to soil productivity. In the discussion of Soil Quality Standards (FSH 2509.18,2.2.1), the handbook states "Prescribe the kind and amounts of soil cover that would not elevate wildfire risk or severity to the point that fuel management and soil quality objectives cannot be met. If there is no viable alternative for providing soil cover without elevating the risk of adverse wildfire effects, prescribe minimum soil cover needed to avoid detrimental soil loss." Management standards for all action alternatives call for maintaining minimum effective soil cover at 50 to 60 percent, depending on slope. (Steeper slopes generally require a higher level of effective ground cover.)

**Porosity:** Tractor piling has the potential to cause detrimental levels of compaction. Monitoring of similar treatments on the Eldorado National Forest has shown that effects on porosity from tractor piling operations would be consistent with LRMP standards for porosity. Activity areas that are proposed for tractor piling have loamy textures and a relatively low risk of soil compaction. Current research results from the Long-Term Soil Productivity Study (Powers et al. 2005) show that logging induced compaction in loamy textured soils does not have a substantial effect on soil productivity.

**Organic Matter:** As with soil cover, litter and duff would be removed from a portion of the activity areas. Management requirements (detailed in Chapter II) should be adequate to protect existing quantities of large woody material; however, piling and burning would likely remove some of the more decayed large woody material. Given fuels reduction objectives for the area, this is considered acceptable for soil resource concerns. Management requirements to retain some fine surface fuels in 50 to 60 percent of the area would require that pile burn prescriptions be designed to avoid excessive soil heating and adverse effects on soil organic matter.

Monitoring of similar work on the Eldorado National Forest has shown that these types of treatments would be consistent with the Forest Plan standards. LRMP standards for large woody material would be met in all activity areas.

Alternative B does not propose hand thinning, tractor piling, and pile burning treatments. All of the action alternatives (Alternatives A, C, and D) propose to treat approximately 621 acres by hand thinning, tractor piling the thinned material and other surface fuels, and subsequently burning the piles. For the reasons described in the preceding paragraphs, these treatments would be expected to meet the LRMP standards for soil cover, soil porosity, and soil organic matter, and would have minimal effects on soil productivity.

**Hand Thinning, Hand Piling, and Pile Burning**

Hand thinning, hand piling of surface and ladder fuels, and pile burning on approximately 65 acres under Alternatives A, C, and D would have the same effects on soil productivity as described above for hand thinning and tractor piling, except that no heavy equipment would be used to make the piles; hence, this treatment would not affect soil porosity. Alternative B does not propose hand thinning, hand piling, and pile burning treatments.

**Underburning**

**Soil cover:** Underburning would result in a temporary reduction of total soil cover, and, in portions of activity areas where concentrations of fuels were burned, soil cover would be eliminated in the short term. Based on observations of previous underburning projects on the Tahoe National Forest, adequate cover for erosion protection would be maintained in at least 60 percent of the underburned area. This would be consistent with the LRMP standard for soil cover.

Forest Service Handbook 2509.18 – Soil Management Handbook provides threshold values for soil properties and conditions to use as indicators of significant change to soil productivity. In the discussion of Soil Quality Standards (FSH2509.18,2.2.1), the handbook states "Prescribe the kind and amounts of soil cover that would not elevate wildfire risk or severity to the point that fuel management and soil quality objectives cannot be met. If there is no viable alternative for providing soil cover without elevating the risk of adverse wildfire effects, prescribe minimum soil cover needed to avoid detrimental soil loss." Management standards for all action alternatives call for maintaining minimum effective soil cover at 50 to 60 percent, depending on slope.

**Porosity:** Underburning would not cause detrimental soil compaction.

**Organic Matter:** As with soil cover, underburning would remove litter and duff from a portion of the activity areas. Management requirements (detailed in Chapter II of this EA) should be adequate to protect existing quantities of large woody material; however, under burning would likely remove some of the more decayed large woody

material. Given fuels reduction objectives for the area, this is considered acceptable for soil resource concerns. Management requirements to retain some fine surface fuels in 50 to 60 percent of the area would require that underburning prescriptions be designed to avoid excessive soil heating and adverse effects on soil organic matter. LRMP standards for large woody would be met in all activity areas.

Alternative B does not propose underburning treatments. All of the action alternatives (Alternatives A, C, and D) propose to underburn approximately 673 acres. For the reasons described in the preceding paragraphs, underburning treatments would be expected to meet the LRMP standards for soil cover, soil porosity, and soil organic matter, and would have minimal effects on soil productivity.

**Mastication of Brush and Small Trees**

Alternatives A, C, and D propose to mechanically masticate approximately 67 acres. The mastication treatments would chip or shred standing vegetation, thereby increasing soil cover and fine organic matter. Mastication would not affect soil porosity as the equipment would travel over a mat of chipped and shredded material. Large woody material would be retained during mastication treatments. Mastication treatments would be expected to meet the LRMP standards for soil cover, soil porosity, and soil organic matter, and would have beneficial effects on soil productivity.

**Precommercial Thinning**

Alternatives A and C propose to precommercially thin approximately 42 acres of existing plantations using chainsaws. Alternatives B and D do not propose precommercial thinning treatments. Precommercial thinning treatments would have effects similar to those describe above for hand thinning and hand piling. Precommercial thinning treatments would not affect soil porosity and would meet LRMP standards for soil cover and organic matter.

**Site Preparation**

Alternatives A and C propose to conduct activities to prepare approximately 60 acres for conifer tree planting. Alternatives B and D do not propose site preparation or tree planting. Site preparation under Alternatives A and C would entail use of an excavator to pull and pile woody shrubs as well as pile concentrations of surface fuels. The piles would be subsequently burned. Because the excavator is a low ground pressure piece of equipment, effects of its use on soils would be similar to those described above for mastication, while effects of pile burning on soil productivity have been addressed in the above under the heading "Hand Thinning, Tractor Piling, and Pile Burning." The proposed site preparation treatments would have minimal effects on soil cover, soil porosity, and soil organic matter, and these treatments would be expected to meet LRMP standards for soil productivity.

### Other Proposed Activities

Some proposed activities, including creation of log structures and cover piles, application of a borate compound to cut stumps, cluster tree planting, protection of large trees during underburning activities, and hand cutting of shrubs in the beargrass area, would not directly or indirectly affect soil productivity. Road management activities take place within a corridor dedicated to roads and trails; therefore, LRMP standards for soil productivity to not apply to these areas. Effects associated with the occasional hazard tree removal are covered in the sections above that discuss effects associated with mechanical thinning treatments.

### Summary of Direct and Indirect Effects

**Soil Cover:** There would be a short-term reduction of soil cover on skid trails and landings. Prescribed burning would also decrease soil cover. All management activities proposed under the action alternatives (Alternatives A, C, and D) are expected to meet LRMP standards for soil cover.

**Soil Porosity:** Detrimental soil compaction is not expected under Alternatives B and D and would be limited in degree and extent under Alternatives A and C. Of the approximately 1,098 acres proposed for tractor operations (either ground-based skidding or tractor piling) under Alternative A, 40 percent of this acreage is on volcanic soils that have low susceptibility to compaction. Other factors which limit the risk and effect of compaction include the sandy loam textures, rock fragment content, and rapid drainage for metasedimentary soils in the other proposed activity areas (48 percent), and management requirements that protect soils during logging and tractor piling. Since the soils in the proposed activity areas have relatively low susceptibility to compaction, compaction caused by the proposed action would be limited to landings and highly compacted skid trails adjacent to the landings. Alternative C proposes approximately 974 acres for tractor operations so would have less of a potential effect on soil porosity compared to Alternative A.

**Soil Organic Matter:** Alternatives B and D do not propose mechanical thinning treatments. Alternative A proposes approximately 940 acres of mechanical thinning while Alternative C proposes to mechanically thin approximately 777 acres. In thinned areas, quantities of large woody material could be somewhat reduced; however, Forest monitoring of previous projects has shown that these areas meet LRMP standards for large woody material retention. Nutrient losses from the proposed thinning treatments would not adversely affect long-term soil productivity.

The above analysis demonstrates that implementation of any of the action alternatives (Alternative A, C, and D) would not result in any irretrievable or irreversible losses of soil productivity. While there would be some short-term effects on soil productivity, long-term adverse effects on the soil resource are not expected. The analysis above discloses the potential for temporary loss of soil productivity on landings and some skid

trails in the treatment areas harvested with ground-based equipment (tractors) due to compaction. However, this would be a temporary effect as these areas would be subsoiled upon completion of harvesting operations. Based on the above analysis, LRMP standards and guidelines for soil porosity, soil cover, and soil organic matter would be met under all of the action alternatives, thereby ensuring that soil productivity would not be irretrievably or irreversibly lost.

## Hydrology:

Forest management activities have the potential to affect hydrologic resources by causing soil disturbance, altering vegetative cover, and changing local drainage patterns. The effects of the proposed management activities are most closely related to the forest health and fuel reduction techniques used. Ground-based mechanical operations have the highest potential impacts on hydrologic processes. Applying the Forest Plan Standards and Guidelines and effective Best Management Practices (BMPs) would reduce the magnitude of the effects on hydrologic resources. In addition, management requirements are included in the action alternatives to avoid sensitive watershed areas or minimize impacts on soil and water resources. The primary concern related to water quality is the impairment of beneficial uses due to an increase of fine sediment caused by accelerated erosion from the proposed project. The risk of direct effects to water quality would be low, because project design and management requirements would minimize impacts on water quality.

Effectiveness of the BMPs in mitigating direct and indirect effects on water quality is largely related to proper implementation and the magnitude of climatic events the first several seasons after project completion. There is a risk that heavy precipitation or rain on accumulations of snow could overwhelm erosion control structures and render them ineffective. The increased sediment delivery to channels would occur only during rare events and for short periods of time where overland flow from disturbed areas occurs. BMPs have been selected using specific information regarding soil, slope, geology, and climate conditions typically found in the Gold Project area.

### Mechanical Thinning with Ground Based Equipment and Aerial Equipment. (Alternatives A and C)

Erosion, sediment, and water quality

Alternative A and C propose approximately 940 acres and 777 acres, respectively, of mechanical thinning treatments. Mechanical thinning involves the use of mechanical, ground-based equipment, and aerial-based equipment (including skyline yarding systems and helicopters). Mechanical thinning with ground-based equipment would be conducted on slopes generally less than 25 percent with chainsaws and/or mechanical harvesters. Short pitches less than 150 feet long and up to 30 percent in slope would also be included. Mechanical thinning with aerial equipment would be conducted on slopes generally greater than 25 percent with chainsaws. The potential direct effects of aerial-based thinning on soils include reduction in soil cover when logs are yarded, mainly

within the skyline corridors and soil compaction on landings and associated temporary roads. The potential direct effects of mechanical, ground-based equipment on soils include a reduction in soil cover; an increase in compaction due to the building of new and the reopening of existing, temporary roads, skid trails, and landings; and soil displacement during skidding operations. The potential direct effects of the thinning on hydrology and water quality depend on how much ground is detrimentally compacted, how much soil cover is removed, steepness of the treated slopes, and the proximity to stream channels.

Ground-based equipment would be operating on slopes with a gradient of generally less than 25%. The slope limitations for each unit were determined based on soil erosion hazard rating, topography, and proximity to streams. There should be minimal alteration of drainage patterns, because runoff would be dispersed by implementation of effective erosion control structures on roads, skid trails, and landings. The thinning operation as proposed should have little direct effects on water quality and/or quantity or flow regime.

The potential indirect effects of ground-based thinning operations on water resources include increased risk of erosion and subsequent sediment delivery to streams. Isolated removal of soil cover and increased compaction can result in greater overland flow caused by reduction in infiltration and soil water storage. The ground-based thinning operation has the potential to indirectly affect hydrology and water quality by increasing water yields, peak flows, and the timing of runoff by compacting forest soil and decreasing transpiration. The amount of cover removed through ground-based thinning operations should not increase the risk of erosion. Maintaining slash on skid trails and implementing effective erosion control structures would reduce erosion from compacted skid trails. The thinning operation as proposed, both ground-based and aerial-based, should result in a minimal increase in the risk of erosion. The treatment prescriptions as proposed would not create large openings and would not remove the amount of basal area necessary to generate increases in water yield or peak flow. The hydrologic effects associated with mechanical thinning, mechanical mastication, tractor piling, pile burning, and underburning are expected to be minimal. The effects of compaction on water yield should be minimal when management recommendations are combined with falling to the lead wherever possible. Tops and branches that are left in the woods in the aerial-based harvest areas would be distributed over the landscape and decrease overland flow of water. Grass, shrubs, and herbaceous ground cover would quickly establish or reoccupy harvested areas. Remaining canopy cover and expected revegetation would aid in reestablishing infiltration rates. Roots of residual and newly established vegetation would hold soil masses together and provide for erosion control.

The direct and indirect effects of constructing temporary roads would be the removal of the topsoil layer and compaction of the road surface. This could increase and redistribute the surface drainage and has the potential to increase erosion and sediment delivery to streams downhill of the road. Road cuts have the potential to affect hydrologic function by disrupting and increasing the surface drainage and by interrupting the subsurface water flow; however, mitigation measures (described in Chapter II) would be

implemented to minimize the potential for these kinds of effects. The effects of temporary roads would decrease after subsoiling and closing the road.

Near stream soil disturbance

Riparian Conservation Areas (RCAs) have been established on all streams within the project area to protect the aquatic and riparian ecosystems. The following RCA widths would be established for the Gold project area: perennial streams – 300 feet, seasonal streams, including intermittent and ephemeral streams – 150 feet, and Special Aquatic Features such as springs/seeps and ponds – 300 feet. Within the RCA, a riparian buffer would be established according to the "Gold RCA Guidelines" where harvest would not be conducted except for safety considerations or to benefit riparian dependant species, as in the aspen restoration areas.

There are 5,503 acres of perennial, intermittent, and meadow RCAs in the four 7th field HUC watersheds potentially impacted by this project. Under Alternatives A and C, ground-based activities are proposed on 8 acres of the perennial, intermittent, and meadow RCAs (less than 1 percent of perennial, intermittent, and meadow RCAs). These alternatives propose aerial-based activities on 70 acres of the perennial, intermittent, and meadow RCAs (less than 2 percent of perennial, intermittent, and meadow RCAs). Generally, the proposed activities would take place on the outer edges of the RCAs.

Given that only 8 acres within RCAs are proposed for ground-based thinning and 70 acres for aerial thinning, the proposed thinning activities have the potential to impact less than 2 percent of the total perennial, intermittent, and meadow RCAs within the analysis area. The project is expected to be in compliance with the Clean Water Act and EOs 11988 and 11990.

**Mastication of small conifers and shrubs. (Alternatives A, C, and D)**

Erosion, sediment and water quality

Mechanical mastication for fuels treatment involves the use of low-ground-pressure (less than 8 psi) equipment. The direct and indirect effects to the soil and water resources are less than that of the mechanical thinning operation since no skidding of material is involved. Temporary roads and landings would not be needed in this operation. Ground-based equipment is used in the mastication operation and therefore potential short-term impacts to soil and water are present. The equipment, however, operates primarily on a self-generated bed of slash. The increased material left on-site after the mastication operation benefits soil by providing soil cover and mulch while reducing evaporation. Management requirements (see Chapter II of this EA) that apply to mechanical thinning operations would also apply to mastication operations.

Alternatives A, C, and D propose approximately 67 acres of mechanical mastication. For the reasons described above, mastication of small conifers and shrubs under these alternatives would not adversely affect water quality.

Near stream soil disturbance

There are no RCAs associated with the one mastication unit in the proposed Gold project and therefore no near stream soil disturbance.

**Hand thinning, tractor or hand piling, burning of the piles and site preparation for planting by machine piling and burning. (Alternatives A, C, and D)**

Erosion, sediment and water quality

Under Alternatives A, C, and D, tractor piling would be used on approximately 621 acres in both commercially thinned and unthinned stands on slopes generally less than 25 percent. Machine piling using an excavator would be used on 60 acres to prepare sites for planting.

Hand piling would be conducted on approximately 65 acres in an unthinned stand that is generally less than 25 percent slope.

Hand thinning, tractor piling and/or hand piling, and pile burning do have potential direct effects. The greatest risk to hydrologic resources can occur when pile burning exposes bare mineral soil over large areas. Water quality can be indirectly affected if soil erosion and subsequent sediment delivery to streams occurs. However, as discussed in the soils analysis above, burning prescriptions would be designed to avoid excessive soil heating and adverse effects on soil organic matter. Fuels reduction through hand cut/tractor pile/burn would result in some exposed bare mineral soil where concentrations of fuels were burned, with a possible hydrophobic layer under the burn piles. However, 50 to 60 percent minimum effective ground cover would be retained across the treated areas to minimize potential erosion and subsequent stream sedimentation.

Near stream soil disturbance

Approximately 28 acres of proposed tractor piling and burning activities are proposed within the perennial, intermittent, and meadow RCAs adjacent to Hog and Pig Canyons and one tributary. The proposed tractor pile and burn activities would follow the Gold Project Riparian Conservation Area (RCA) Guidelines for "Equipment Restrictions" and "Prescribed Fire Requirements" while meeting the Forest Plan soil cover requirements. Implementation of these measures would ensure that tractor piling and burning within these RCAs would not directly or indirectly affect soils near streams.

**Underburning**

**(Alternative A, C, and D)**

Erosion, sediment and water quality

The greatest risk to hydrologic resources can occur when underburning exposes bare mineral soil over large areas, potentially increasing erosion and subsequent stream sedimentation. As disclosed in the soils analysis above, while underburning would temporarily reduce soil cover, the burning prescriptions would be designed to ensure the retention of 50 to 60 percent effective soil cover and would meet LRMP standards for organic matter. Retaining soil cover and reducing the potential for soil erosion would reduce the potential for stream sedimentation as a result of the approximately 673 acres of underburning proposed under Alternatives A, C, and D.

Near stream soil disturbance

Approximately 42 acres of proposed underburning would be conducted within the perennial RCAs adjacent to Butcher Ranch Creek and one tributary. There are 46 acres of proposed underburning within the meadow RCAs adjacent to Butcher Ranch Meadow and near Sierra Buttes. The proposed underburning activities includes would follow the Gold Project Riparian Conservation Area (RCA) Guidelines for "Prescribed Fire Requirements" while meeting the Forest Plan soil cover requirements. Implementation of these measures would ensure that underburning within these RCAs would not directly or indirectly affect soils near streams.

**Precommercial thinning and planting without site prep. (Alternative A and C)**

Erosion, sediment and water quality

Precommercial thinning on approximately 42 acres would involve hand cutting and lop and scattering trees less than 10 inch DBH. The planting without site prep would occur on approximately 73 acres. Both of these treatments involve hand work without the use of ground disturbing equipment and therefore would not detrimentally effect erosion, sediment, or water quality. The precommercial thinning would add effective soil cover through lop and scattering slash.

Near stream soil disturbance

Because these activities do not involve the use of ground disturbing equipment, they would not be expected to adversely affect near stream soils conditions. Implementation of management requirements (detailed in Chapter II), Gold Riparian Conservation Area (RCA) Guidelines, and BMPs would ensure minimal, if any, impacts to near stream environments.

**Identify and remove hazardous trees along Forest Service system roads within units.**

Erosion, sediment and water quality

Roadside hazard tree reduction activities would occur along specified roads within the Gold project area. The potential direct and indirect effects of hazard tree removal along Forest Service system roads would be the same as the effects described above under "Mechanical Thinning with Ground Based Equipment and Aerial Equipment." The hazard tree remove would take place at the same time and within the same mechanical thinning unit boundaries.

Near stream soil disturbance

There are approximately 3 acres of RCAs where hazard tree removal activities, within units, are proposed. These units, adjacent to roads and within RCAs, are proposed for aerial thinning. Hazard tree removal in these RCAs would have minimal potential for near stream soil disturbance under implementation of management requirements (detailed in Chapter II of this EA), Gold Project Riparian Conservation Area (RCA) Guidelines, and BMPs.

**Maintain National Forest System Roads, Close or Decommission Unnecessary Roads, and Reconstruct approximately 1 mile of Road 93-7. (Alternatives A and C)**

Erosion, sediment and water quality

Both Alternatives A and C propose road maintenance as well as road closure and decommissioning activities. It is a well documented fact that road related erosion is a primary source of accelerated erosion in forests throughout the western United States (Kattleman 1996). Road erosion rates are typically much greater than hillslope erosion rates and are highly variable, dependent on factors such as percent hillslope, location on slope, parent material, and years since construction or maintenance. The improvement to the current road system would reduce sources of erosion and sediment delivered to the stream system. Maintenance, repair, and reconstruction of the current road system includes clearing roadside brush and debris, surface grading, rocking identified sections of roads within RCAs, and installation of drivable waterbars and/or dips. These improvements would have both direct and indirect benefits to the stream system by reducing erosion and sediment coming from the road system and its effects on downstream beneficial uses. Closure or decommissioning of unnecessary Forest Service or temporary roads would achieve several objectives through the road decommissioning process. Primary objectives include erosion control and restoration of the hillslope hydrology. Secondary objectives include protection of aquatic habitat, acceleration of re-establishment of pre-existing native plant communities, and wildlife habitat protection and enhancement. The decommissioned roads would be restored by use of a tractor with winged rippers and in some cases the use of a tractor and excavator. The tractor with winged rippers is used to break up the compacted road surface. Erosion control devices (waterbars) and in some cases mulch would be deposited on the road surface to minimize

erosion. The entrance to the road would be blocked by construction of double earthen barriers to prevent future use. The project is designed to promote natural recovery of the road surface by restoring the natural hydrologic function (infiltration capacity) of the soil in the roadbed, reducing runoff and erosion. This operation does not involve complete obliteration of the road. The road prism is still intact along with any cut and fills. If the road was needed at a later time, the road could be used but would need vegetation clearing and grading to facilitate use.

Near stream soil disturbance

These activities would have little potential to disturb near stream soils when management requirements, Gold Riparian Conservation Area (RCA) Guidelines, and BMPs were implemented. Removal of unnecessary Forest Service or temporary roads would have both direct and indirect benefits to the stream system by reducing erosion and sediment coming from the road system and its effects on downstream beneficial uses. Identified roads would be closed after use to vehicular traffic by waterbarring the road surface and placing log/earth barriers at the entrance to reduce erosion and sediment sources and promote vegetative growth on previously compacted surfaces.

**Direct and Indirect Effects of the No Action Alternative (Alternative B)**

Under Alternative B, existing conditions in the four HUC7 drainages in the Gold Project area would continue to proceed through natural processes. Natural processes include: hill slope erosion and stream channel sedimentation, recruitment of coarse large woody debris (CWD), and balancing stream flow, stream gradient and stream substrate composition. Alternative B would have both positive and negative impacts on watershed conditions. The No Action Alternative would also preclude opportunities that may benefit watershed resources, such as, thinning overstocked stands of trees, restore aspen stands, reduce fuels accumulation by underburning and mastication, and improving portions of the road system that are currently delivering sediment to the stream system.

A positive outcome of the No Action Alternative is that no short-term ground disturbance would occur, thus reducing the potential for increased sediment transport to streams, loss of soil cover, or degradation of riparian or aquatic habitats associated with land management activities.

## **Wildlife**:

Information used in assessing effects includes: computer Geographical Information System layers (e.g. Digital Orthophoto Quads, Sierra Nevada Forest Plan Amendment Land Allocations, Forest Vegetation and Disturbance layers for public and private land, streams, roads, California spotted owl and northern goshawk Protected Activity Centers and Home Range Core Areas), aerial photos, survey records and species sighting data. Fish and wildlife species-specific surveys conducted in all or portions of the project area include: California spotted owl, northern goshawk, willow flycatcher, great gray owl,

and mountain yellow-legged frog. Site-specific stand data includes field review by biologists, the District Silviculturist, and existing stand condition data on: ground fuels, canopy cover, snags, downed logs, and trees per acre broken down by diameter class and species. Aquatic assessments include information gained through stream surveys, amphibian habitat assessments, evaluation of the potential effects of proposed treatments in riparian conservation areas (RCAs), and the results of the cumulative watershed effects analysis.

The following reports address the direct, indirect, and cumulative effects from the alternatives to wildlife species in detail, and they are incorporated into this EA by reference: (1) Biological Evaluation for Birds, Mammals, Amphibians, Reptiles, Fish, and Invertebrates dated September 13, 2010, and (2) Management Indicator Species Report dated April 2, 2010.

There are no federally endangered, threatened, or proposed species or their designated critical habitat within the project area that may be affected by the proposed actions. No California red-legged frog populations have been found that occur in the Tahoe National Forest, and no Critical Habitat is present in the project area. This project is above the elevational range of the Elderberry longhorn beetle. The Biological Evaluation has determined that there is no effect from any of the alternatives to any federally protected species.

The following Region 5 Forest Service Sensitive Species, or their habitat, are present within or near the project area: California spotted owl, great gray owl, northern goshawk, willow flycatcher, Pacific fisher, American marten, Sierra Nevada red fox, California wolverine, pallid bat, Townsend's big-eared bat, and the mountain yellow-legged frog.

A Biological Evaluation has determined that the alternatives: 1) will not affect the bald eagle, greater sandhill crane, western red bat, northwestern pond turtle, foothill yellow-legged frog, mountain yellow-legged frog, northern leopard frog, Great Basin ramshorn snail, Lahontan Lake tui chub, hardhead; and 2) may affect, but will not lead to a trend toward listing of, the California spotted owl, northern goshawk, willow flycatcher, great gray owl, Pacific fisher, American marten, Sierra Nevada red fox, California wolverine, pallid bat, and Townsend's big-eared bat.

The following Management Indicator Species were selected for analysis for this project from the list of MIS identified in the Tahoe National Forest Land and Management Plan: fox sparrow, mountain quail, California spotted owl, American marten, northern flying squirrel, and hairy woodpecker.

**Effects Common to each of the action alternatives (Alternatives A, C, and D)**

**Direct Effects:** Direct effects to wildlife may occur from killing, injuring, or displacing individuals or interfering with feeding, movement, and migration. Noise from operating motorized equipment during project implementation, or smoke from prescribed burning, could displace individual animals from the vicinity of units. The proposed activities

cover a maximum of approximately 2,563 acres (16%) out of 16,610 acres of National Forest System land within the Gold Project area. Individual activities are typically implemented over a five to ten-year period, which spreads out disturbances both spatially and temporally within any one location. This further limits the area affected by disturbances to an estimated area of 2 to 8% of the project area in any individual year. This effect is temporary, lasting only several months during the year when they are implemented. Recent surveys have been conducted following Region 5 protocol for the following sensitive species: California spotted owl, northern goshawk, willow flycatcher. Conducting surveys to protocol insures for consistency in searching for breeding territories, and limited operating periods are included in the management requirements where territories have been located, to reduce the potential for projects to disrupt breeding.

**Indirect Effects:** Indirect effects to wildlife may occur from altering the quantity or quality of habitat.

In all three action alternatives (A, C, D), fuels treatment would occur in a total of 628 acres of habitats dominated by montane chaparral (shrub) as follows: hand cut, tractor pile and burn 289 acres; prescribe burn 290 acres, masticate 56 acres. These treatments would reduce dense shrub cover to sparse on 628 acres, which represents 7 percent of shrub-dominated habitats within the project area.

The fuel treatments would rejuvenate presently decadent shrubs and encourage sprouting vegetation that provides high quality food for wildlife such as deer, and small mammals like woodrats, and mice (*Peromyscus* sp.) which are prey species of sensitive species such as spotted owls, goshawks and forest carnivores. Prescribed burning in shrubs would favor deerbrush (*Ceanothus integerrimus*) and whitethorn (*Ceanothus cordulatus*) over white-leaf manzanita (*Arctostaphylos viscida*) and greenleaf manzanita (*Arctostaphylos patula*), because *Ceanothus* grows more quickly, and is generally considered to be an early successional shrub species compared with manzanita. *Arctostaphylos patula*, which re-sprouts from an underground burl, is present in the higher elevations (generally above 4000 feet), while *Arctostaphylos viscida*, which may be present at elevations below *A. patula*, does not resprout and is a fire-obligate seeder. Where it is present, its persistent seedbank is expected to germinate vigorously following fire.

In contrast, cutting brush by hand and piling it for burning would not favor *Ceanothus* in the same way, because it would not stimulate the germination of new seedlings from the seedbank in the soil. In general, burning would reduce shrubs immediately following fire, but within several years, it would be likely to cause *Ceanothus* species to become more dominant where overstory canopies did not shade them out.

Proposals to hand cut, pile and burn smaller diameter trees; masticate understory vegetation; and prescribed burn, are not expected to change the vegetation strata or California Wildlife Habitat Relationships (CWHR) type. Studies have shown that small mammals (woodrats, deer mice) quickly repopulate burned areas, provided there are nearby unburned refugia to provide source populations. Masticating and burning may

reduce small mammal populations in the first year or two following implementation, but populations are expected to readily recover thereafter. Therefore, effects to small mammal populations are limited in scope, both spatially and temporally. Implementing projects using a variety of techniques (masticating, prescribed fire, hand cutting, thinning) varies the types of effects spatially throughout the watershed; and implementing projects with appropriated funding usually distributes these effects temporally, because not all projects in the watershed are fully funded in any given year.

Large snags and downed logs provide nesting, resting, and sheltering structures for spotted owls, forest carnivores, and their prey, and they represent an important component of habitat for wildlife. Downed logs provide nutrient cycling, maintain soil moisture and provide microclimates for fungi; and fungi are an important food source for small rodents which are the primary prey for many wildlife species.

Alternatives A, C, and D propose underburning within 281 acres (7%) of mid-seral closed-canopy forests, and within 46 (4%) acres of late-seral, closed canopy forests. Prescribed burning is only proposed where existing conditions indicate a high probability of successfully retaining post-treatment stand conditions that are desirable in older forests. Burn plans identify local conditions and desired outcomes at a stand scale, and they include the desire to minimize the loss of large trees, large downed logs, and large standing snags where practical and where firefighter safety is not compromised. Some existing snags and down logs would be consumed by the fire, and some trees would be expected to die from the additional stress of underburning. These would be recruited as snags, which will eventually fall and become down logs.

Stephens and Moghaddas (2005) found that use of prescribed fire increased the density of snags greater than 15 cm DBH, and did not significantly alter coarse woody debris in decay classes 1 and 2. In the same study by Stephens and Moghaddas (2005), fire reduced coarse woody debris in decay classes 3 and 4. The use of prescribed fire will increase the fire resilience of these stands to catastrophic loss in a wild fire, and it re-introduces fire back into the system as a dynamic process.

There are no known non-native, invasive species known to be present within the analysis area. Mitigations (Chapter 2, Table 2.1 “Management Requirements”) would be implemented under the action alternatives to prevent the spread of noxious weeds into the project area from the proposed actions. This would help to sustain native vegetation and the quality of wildlife habitat.

**Effects that Vary by Alternative**

Alternatives A and C both include proposals to mechanically thin closed-canopy conifer stands, remove hazard trees along roads within thinning units, implement aspen and oak enhancement, create wildlife cover piles, and decommission roads. Alternative D only implements fuels reduction proposals described above. No thinning would occur in Alternative D.

The units proposed for thinning under Alternatives A and C presently have either suppressed oaks and/or small conifers dominating their under-story; few palatable, nutritious shrubs and herbaceous vegetation are present. Thinning would not reduce dominant over-story tree canopy cover, and the proposals in Alternatives A and C retain all post-treatment canopy covers above 40 percent, which would not effectively rejuvenate existing shrubs or stimulate seedling establishment for shade intolerant species. But thinning overstocked stands that create small openings in the canopy around oaks and other large trees will also promote the growth of some herbaceous vegetation and brush, which would increase plant species diversity within a few years.

Silvicultural prescriptions for thinning in Alternatives A and C within existing closed-canopy stands are designed to meet several objectives: (1) promote black oak and aspen by removing competing conifers, (2) improve conifer species diversity, by selecting against white fir and favoring pine, (3) reduce conifer density by thinning out understory and some co-dominant trees, (4) retain legacy trees within aspens, and all trees greater than 30 inches diameter outside of aspen restoration stands, (5) retain trees with good characteristics for supporting wildlife, such as trees with multiple tops and cavities, and (6) thin irregularly to meet the previous objectives and to increase within-stand heterogeneity in structure and species composition. Thinning overly dense stands reduces their susceptibility to insect attack, which causes unnaturally high levels of mortality during periods of sustained drought. Thinning crowded trees also allows the remaining trees to develop larger crowns and branches, which provides thermal cover for wildlife, and perching and resting structures. Larger oak crowns improve their ability to produce acorns. Because different tree species produce abundant seed crops in different years, promoting hardwoods and increasing tree species diversity within stands provides a more reliable seed source from year to year. This maintains prey populations for many predatory birds and mammals, including the following sensitive species: California spotted owl, northern goshawk, American marten, Pacific fisher, Sierra Nevada red fox and wolverine.

No thinning would space trees so far apart so that arboreal (tree-dwelling) mammals would no longer use them. In a study in the Tahoe National Forest, Garrison et al. (2005) conclude that group select harvests where trees are harvested from small areas (less than 1 ha) should maintain populations of gray and Douglas squirrels. Snags and downed logs are important components of wildlife habitat by providing nesting habitat for spotted owls, resting and denning habitat for forest carnivores, shelter for prey species, and subnivean access points used by marten for foraging. Timber harvest would retain all existing logs, and any non-merchantable cull would be left for wildlife, which would result in a small increase in downed logs.

Small mammals use downed wood as travel corridors, cover, and as foraging places for arthropods and fungi. They also use herbs and shrubs for hiding cover and food. These structural components of forests may also be important for moderating microclimate, especially at the forest floor. Thinning and underburning alter the quantity and spatial distribution of down wood and ground vegetation, which may change small mammal

populations. Fire and thinning can decrease the abundance of forest truffles, thereby reducing a major food source for many small mammals (Meyet et al. 2005).

Within similar vegetation types as this project (ponderosa pine and white fir forests), Maguire et al. (2008) studied small mammal responses to silvicultural manipulation of forest structural diversity and subsequent underburning. Treatments differed from high structural diversity (many large old trees, abundant snags, multiple canopy layers with dense clumps of smaller trees and many canopy gaps) to low structural diversity (single canopy layer of well-spaced overstory trees ranging in dbh from 30 to 50 cm with very few canopy gaps). They found that: (1) Shrub cover, down wood cover, and overstory basal area were the most important for determining small mammal presence, (2) Although there was some shift in the species that were present, but there were no detectable effects when combining the three most abundant species (*Tamias amoenus, Peromyscus maniculatus, and Spermophilus lateralis*). Therefore, the proposed treatments are not expected to reduce the quantity of small mammal prey that are important to numerous Forest Service Sensitive species.

Proposals to construct wildlife cover piles helps to mitigate reduced cover (hiding and thermal) for small mammals following thinning, masticating, and burning within units. Proposals to remove small diameter conifers (less than 10" dbh) from beneath and around oaks will remove non-commercial conifers that would otherwise compete for sunlight and nutrients, and eventually grow to overtop them and shade them out.

Alternatives A and C would remove hazard trees along roads within units proposed for thinning. General guidelines for snag retention levels in the Sierra Nevada Forest Plan Amendment are to retain four of the largest snags per acre. Stand exam data collected within the project units show that there is a wide range of snags greater than 15 inches dbh present within individual units, ranging from 0 to 21 snags per acre, averaging approximately 8 per acre. Most snags are less than 30 inches dbh, and the data indicate that approximately half of the units contain $\geq$ 1 snag per acre >30" dbh. Some stands contain very large numbers of snags that are less than 15 inches dbh. The proposed removal of hazard trees along roads will reduce snags in the immediate vicinity of roads within 13 of the units proposed for thinning. The numbers of dead trees that would be considered present hazards to the road were counted in 2009, and these data are presented in Table 5 as a relative estimate of the numbers and size ranges of trees that would be removed. These numbers represent a negligible number of snags that would be considered hazards along the roads, and their removal would not reduce the estimated numbers of snags per acre present within units. Hazard tree removal along roads is proposed within approximately 15 acres of forested habitat. This represents less than 1% of the mid to late-seral stage forested habitat present within the project area. Therefore, removing hazard trees will have a negligible effect on the snags that are available to wildlife.

| Table 3-1. Proposed thinning units where trees may present a hazard to roads, showing the numbers of dead trees identified in 2009 timber cruise, broken down by four ranges of dbh, that would be eligible for hazard tree removal. | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Unit No** | **Ac.** | **15" - 19"** | **20" - 23"** | **24" - 29"** | **> 30"** | **Estimated snags/ac pre-project** | **Estimated snags/ac post-project** |
| 14 | 27 | 1 | 2 | 0 | 2 | 1 | 1 |
| 16 | 30 | 0 | 1 | 1 | 0 | 8 | 8 |
| 17 | 13 | 1 | 0 | 0 | 0 | 15 | 15 |
| 19 | 17 | 1 | 1 | 0 | 0 | 14 | 14 |
| 21 | 14 | 0 | 0 | 0 | 0 | 5 | 5 |
| 27 | 110 | 0 | 0 | 0 | 0 | 6 | 6 |
| 31 | 14 | 0 | 0 | 1 | 0 | 8 | 8 |
| 32 | 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| 34 | 21 | 0 | 0 | 0 | 0 | 10 | 10 |
| 35 | 16 | 0 | 0 | 0 | 1 | 8 | 8 |
| 36 | 33 | 0 | 0 | 1 | 0 | 8 | 8 |
| 37 | 34 | 0 | 0 | 1 | 0 | 21 | 21 |
| 38 | 62 | 0 | 2 | 1 | 0 | 10 | 10 |

Aspen enhancement is proposed on approximately 22 acres in Alternatives A and C. The delineation of stands on the ground would follow site-specific conditions using the presence of aspen suckers and the description in the proposed action (the maximum treatment area would be identified as a distance surrounding the aspen stand or where living aspen trees or sprouts are present): 1.5 tree heights on the east and west sides of the aspen stand, 2 tree heights from the south side of the aspen stand, and 1 tree height on the north side. Table 3-2. displays the proposed aspen treatment units showing their stand loss risk factor in context with 60 aspen stands that have been inventoried in the District.

| Table 3-2. Comparison of aspen stands in the Gold project with 60 aspen stands inventoried in the Yuba River Ranger District (YRRD), showing their stand loss risk factor using standardized Region 5 aspen inventory protocols. | | | | | |
|---|---|---|---|---|---|
| **Gold Stand No.** | **Stand Loss Risk Factor Rank** | | | | |
| | **Highest** | **High** | **Moderate** | **Low** | **None** |
| 50 | | X | | | |
| 51 | X | | | | |
| 52 | X | | | | |
| 53 | X | | | | |
| 54 | | X | | | |
| 55 | | X | | | |
| **Totals for YRRD 60 inventoried stands** | **21** | **19** | **14** | **4** | **1** |

All aspen treatments are proposed solely for the purpose of aspen restoration. Aspen is a shade-intolerant species that requires sunlight to persist. In the west, aspen reproduce primarily through root suckering. Suckering is regulated by hormones that are partially stimulated by sun heating the ground. Within the Yuba River Ranger District, approximately 60 aspen stands have been inventoried and assessed for their risk of loss

using the Current Field Methodology for Assessing Aspen Stands (www.dfg.ca.gov/rap/projects/aspen). These assessments have found that 90% of aspen stands rank at a moderate to highest risk of loss for long-term survival. All aspen stands within Butcher Ranch Meadow were ranked at a high to highest risk of loss because shading from conifers in the over story is suppressing regeneration and causing mature trees to die. General recommendations are to remove conifers within a distance of 300 feet around live aspens and their sprouts. Buffering the present aspen stands by 300-feet indicates that this meadow was once dominated by a contiguous stand of aspens, whereas it presently is dominated by conifers. Removing conifers from around these stands will increase sunlight to existing aspens and it should encourage aspen suckering and regeneration (Shepperd, W.D. 2004). Over time, this should promote a multi-aged aspen stand that can better sustain itself for the next 50 years, and that better represents the historic occurrence of aspen in this meadow.

Conifers have higher transpiration rates and take up more water than deciduous aspens, which are deciduous (Bartos and Campbell 1998, La Malfa and Ryle 2008). Removing conifers is expected to raise the water table within localized areas of the meadow. Mature aspens are currently distributed throughout a variety of topological features around this meadow (adjacent to wet areas, and graduating into the adjacent hillslopes). Subsequently, raising the water table in some areas may flood out some aspen roots and kill them, but there is a sufficient distribution of mature trees within upslope areas that would survive to regenerate a stand where the water table is conducive to supporting aspens. Any associated rising of the water table is expected to expand wet meadow habitats, while still expanding the aspen stand. This would increase wildlife habitat diversity, and benefit not only the persistence of the aspen stand, but numerous wildlife species that are also associated with aspens, especially bird species diversity (Barnett, R. unpublished results from QLG songbird monitoring 2007-2008; Shepperd et al 2006).

The opening of the understory within aspen stands presents a concern for cattle accessing the stand and over browsing aspen suckers and inhibiting regeneration. Hand-cutting conifers would provide opportunities to place the cut trees in such a way as to create barriers to cattle to discourage their access and prevent this damage.

Application of a registered borate compound to cut conifer stumps greater than 14 inches dbh in order to reduce the chance of new infection centers of Annosus fungi being created through harvest activity would only occur within units 23, 27, 32, and 39 (Chapter II, Table 2-1, Management Requirement for Forest Vegetation). None of these units have any riparian areas within them, and this action would not negatively affect any Forest Service Sensitive amphibian species.

Existing road densities range from 0.5 to six miles of road per square mile. Alternatives A and C include proposals to decommission approximately 5.1 miles of road that are spread out across the project area, which would not reduce overall road densities within the watershed, but it would slightly reduce road densities within the immediate area of where they occur. Approximately 0.5 miles of decommissioned road presently accesses a sensitive goshawk area, which would reduce human disturbances to this sensitive species.

**Comparison of the differences between thinning under Alternatives A and C**

Alternatives A and C vary from one another in the units proposed for mechanical thinning in three ways: (1) the total number of acres that are thinned, (2) post-treatment canopy cover, and (3) the maximum diameter of tree that would be removed. Table 3-3 displays these differences by unit. Alternative A would reduce canopy cover within approximately 940 acres of conifer stands that are thinned, while Alternative C would reduce canopy cover within approximately 777 acres of conifer stands. Table 3-3 shows the existing canopy cover within each unit using stand exam data, and the estimated canopy cover (using the Forest Vegetation Simulator) following thinning in Alternatives A and C. Under Alternative C, the maximum diameter tree that could be removed is 20 inches diameter breast height (dbh), while in Alternative A, trees may be selected from a variety of diameter size classes, with maximum diameters as indicated in Table 3-3 up to 30 inches dbh, depending on individual stand characteristics and the desired condition of increasing structural diversity within each stand. Tables showing individual stand characteristics, including Stand Density Indices (SDI) and Trees Per Acre (TPA) by unit are shown in Tables A_1, B_1, A_2, & B_2 (see Appendix D, Vegetation Data).

**Table 3-3. Mechanical thinning units in the Gold Project showing the pre- and post-treatment canopy cover and the maximum tree diameter breast height (dbh) that may be removed under Alternatives A and C.**

| Unit No. | Unit (Ac.) | Existing Canopy Cover (%) | Alternative A Post-treatment Canopy Cover (%) | Alternative C Post-treatment Canopy Cover (%) | Alternative A Maximum tree dbh removed (inches) | Alternative C Maximum tree dbh removed (inches) |
|---|---|---|---|---|---|---|
| **1** | 12 | 87 | 70 | 81 | 29 | 20 |
| **2** | 9 | 92 | 89 | 90 | 29 | 20 |
| **3** | 29 | 94 | 91 | 91 | 29 | 20 |
| **4** | 7 | 74 | 50 | 58 | 23 | 20 |
| **5** | 28 | 76 | 59 | 59 | 29 | 20 |
| **6** | 6 | 60 | 53 | 50 | 24 | 20 |
| **8** | 17 | 61 | 54 | 54 | 29 | 20 |
| **10** | 103 | 77 | 68 | 72 | 19 | 20 |
| **11** | 39 | 62 | 50 | 50 | 23 | 20 |
| **13** | 5 | 65 | 55 | dropped | 29 | dropped |
| **14 threat** | 27 | 70 | 54 | 52 | 29 | 20 |
| **14>4N** | | | | | | 11 |
| **15** | 42 | 65 | 62 | 61 | 29 | 11 |
| **16** | 30 | 53 | 48 | 50 | 29 | 11 |
| **17** | 13 | 48 | 45 | dropped | 29 | dropped |
| **18** | 32 | 61 | 58 | 50 | 29 | 20 |
| **19** | 17 | 54 | 48 | 52 | 29 | 11 |
| **21*** | 14 | 40 | 40 | 40 | NA | NA |
| **23** | 76 | 42 | 40 | 40 | 29 | 29 |
| **24** | 18 | 72 | 50 | 65 | 17 | 11 |
| **27** | 110 | 72 | 51 | 65 | 17 | 11 |
| **30** | 35 | 69 | 54 | 66 | 21 | 11 |
| **31** | 14 | 58 | 52 | 50 | 19 | 20 |
| **32** | 12 | 74 | 72 | 72 | 29 | 20 |
| **33** | 28 | 51 | 50 | 50 | 29 | 20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **34** | 21 | 86 | 85 | 84 | 29 | 20 |
| **35** | 16 | 50 | 42 | dropped | 29 | dropped |
| **36** | 33 | 56 | 54 | dropped | 29 | dropped |
| **37** | 34 | 45 | 41 | dropped | 29 | dropped |
| **38** | 62 | 44 | 40 | dropped | 29 | dropped |
| **39** | 4 | 71 | 52 | 51 | 16 | 20 |
| **42** | 47 | 86 | 85 | 84 | 29 | 20 |
| **Total Acre** | 939 | | | | | |
| **Canopy** | | Range = 42-94 | Range = 40-89 | Range = 40-91 | | |
| **Max. dbh Removed** | | | | | Range = 16-29 | Range = 11-20 |
| *Unit 21 is hazard tree removal only; unit is delineated linearly along the road. | | | | | | |

Post-treatment canopy closures in Alternative A do not vary substantially from those in Alternative C; canopy cover on 725 acres (77%) of the acres thinned would differ less than 5% between Alternatives A and C. These differences are small, they are based on overall averages derived from computer modeling, and in some units post-treatment canopy cover is greater in Alternative C, while in others it is less (Table 3-3). Because canopy cover usually varies more than this within natural stands, it is unlikely that the differences between Alternatives A and C are biologically meaningful to wildlife. Six units (214 acres) have post-treatment canopy cover differences between Alternatives A and C that are in excess of 5% (Units 1, 4, 18, 24, 27, 30). These units comprise less than 4% of mid- to late-successional closed-canopy forests (California Wildlife Habitat Relationship types $\geq$ 4M) that are present within the project area, which represents a small quantity of habitat, which is also dispersed spatially throughout the larger 16,000-acre project area.

Canopy cover would be retained above 50 percent under both Action Alternatives within all units where the pre-existing canopy exceeds 50 percent, except for Unit 19 (17 acres). The existing 53% canopy cover would be reduced to 48% in Alternative A, and 50% in Alternative C. Retaining canopy cover above 50% should retain these habitats for continued use by many sensitive species which prefer closed canopy stands (California spotted owl, northern goshawk, American marten, Pacific fisher). All of the proposed mechanical thinning units lie within the Old Forest Emphasis Area Land Allocation, and all units lie within the Tahoe National Forest's Forest Carnivore Network. Effects from this action are not expected to reduce habitat quality for late-successional associated species to an extent that would lead to a trend toward listing for any USDA Forest Service Region 5 Sensitive Species. This is further discussed where it may affect individual sensitive species in the Biological Evaluation for wildlife.

The existing CWHR type for each thinning unit proposed, and the changes that would occur from each of the two action alternatives (Alternative A and C) are listed for each of the units in Table 3-4. Alternative A would change CWHR types from 4D (dense canopy cover) to 4M (moderate canopy cover) on 199 (21%) out of the 940 acres that are thinned, while Alternative C would change 91 (12%) of the 777 acres that would be thinned. Conifers would be removed from an additional 22 acres of aspen stands in Alternatives A and C.

| Table 3-4. Mechanical thinning units in the Gold Project showing the pre- and post-treatment vegetation by California Wildlife Habitat Relationship type (CWHR). | | | | |
|---|---|---|---|---|
| **Unit No.** | **Estimated Acres** | **Existing CWHR type* (Alternative B)** | **Alt. A** | **Alt. C** |
| 1 | 12 | 4D | 4D | 4D |
| 2 | 9 | 5D | 5D | 5D |
| 3 | 29 | 5D | 5D | 5D |
| 4 | 7 | 4M | 4M | 4M |
| 5 | 28 | 4M | 4M | 4M |
| 6 | 6 | 4M | 4M | 4M |
| 8 | 17 | 4M | 4M | 4M |
| 10 | 103 | 4D | 4M | 4D |
| 11 | 39 | 4D | 4M | 4M |
| 13 | 5 | 4D | 4M | dropped |
| 14 | 27 | 5M | 5M | 5M |
| 15 | 42 | 5M | 5M | 5M |
| 16 | 30 | 5M | 5M | 5M |
| 17 | 13 | 4M | 4M | dropped |
| 18 | 32 | 4M | 4M | 4M |
| 19 | 17 | 4D | 4M | 4M |
| 21 | 14 | 4M | 4M | 4M |
| 23 | 76 | 4M | 4M | 4M |
| 24 | 18 | 4M | 4M | 4M |
| 27 | 110 | 4M | 4M | 4M |
| 30 | 35 | 4D | 4M | 4M |
| 31 | 14 | 4M | 4M | 4M |
| 32 | 12 | 4D | 4D | 4D |
| 33 | 28 | 4M | 4M | 4M |
| 34 | 21 | 4D | 4D | 4D |
| 35 | 16 | 4M | 4M | dropped |
| 36 | 33 | 5M | 5M | dropped |
| 37 | 34 | 4M | 4M | dropped |
| 38 | 62 | 4M | 4M | dropped |
| 39 | 4 | 4M | 4M | 4M |
| 42 | 47 | 4D | 4D | 4D |
| Totals | 939 | | | |
| *Note: Existing CWHR type is identified using stand exam data, rather than mapped strata. | | | | |

Projections for the amount of canopy that is estimated to return after 20 years were calculated using the Forest Vegetation Simulator (FVS), and they are displayed for each unit by alternative in Table 9. In both Alternatives A and C, the canopy cover projections 20 years following treatment are similar to those of Alternative B (No Action). Therefore, any reduction in the quality of late-successional habitat that may occur from reducing canopy cover through thinning is a short-term effect, lasting 20 years or less. Appendix D of the Environmental Assessment details these projections after 10, 20, and 30 years.

**Table 3-5. Mechanical thinning units in the Gold Project showing the pre- and post-treatment canopy cover and the estimated canopy cover (using the Forest Vegetation Simulator)in 20 years following treatment for each of the Alternatives—A (proposed action), B (no action), and C (20 inch dbh maximum).**

| | | Canopy cover Pre- and post-treatment | | | Canopy cover estimate in 20 years | | |
|---|---|---|---|---|---|---|---|
| | | Exist. Cond. | Action Alternatives (post-treatment) | | Existing Cond. | Action Alternatives | |
| Unit No. | Unit (Ac.) | Pre-treat. | Alt A post-treatment | Alt C post-treatment | Pre-treatment | Alt A | Alt C |
| 1 | 12 | 87 | 70 | 81 | 81 | 83 | 87 |
| 2 | 9 | 92 | 89 | 90 | 95 | 97 | 96 |
| 3 | 29 | 94 | 91 | 91 | 95 | 97 | 96 |
| 4 | 7 | 74 | 50 | 58 | 71 | 60 | 66 |
| 5 | 28 | 76 | 59 | 59 | 79 | 80 | 80 |
| 6 | 6 | 60 | 53 | 50 | 59 | 57 | 54 |
| 8 | 17 | 61 | 54 | 54 | 74 | 71 | 71 |
| 10 | 103 | 77 | 68 | 72 | 74 | 75 | 76 |
| 11 | 39 | 62 | 50 | 50 | 62 | 57 | 57 |
| 13 | 5 | 65 | 55 | dropped | 50 | 52 | dropped |
| 14 | 27 | 70 | 54 | 52 | 77 | 59 | 59 |
| 15 | 42 | 65 | 62 | 61 | 72 | 73 | 73 |
| 16 | 30 | 53 | 48 | 50 | 71 | 71 | 72 |
| 17 | 13 | 48 | 45 | dropped | 66 | 66 | dropped |
| 18 | 32 | 61 | 58 | 50 | 67 | 65 | 60 |
| 19 | 17 | 54 | 48 | 52 | 52 | 49 | 53 |
| 21 | 14 | 40 | 40 | 40 | 73 | 73 | 73 |
| 23 | 76 | 42 | 40 | 40 | 64 | 64 | 44 |
| 24 | 18 | 72 | 50 | 65 | 56 | 53 | 56 |
| 27 | 110 | 72 | 51 | 65 | 57 | 54 | 57 |
| 30 | 35 | 69 | 54 | 66 | 54 | 55 | 53 |
| 31 | 14 | 58 | 52 | 50 | 59 | 63 | 60 |
| 32 | 12 | 74 | 72 | 72 | 78 | 80 | 77 |
| 33 | 28 | 51 | 50 | 50 | 76 | 76 | 77 |
| 34 | 21 | 86 | 85 | 84 | 86 | 87 | 90 |
| 35 | 16 | 50 | 42 | dropped | 44 | 40 | dropped |
| 36 | 33 | 56 | 54 | dropped | 67 | 65 | dropped |
| 37 | 34 | 45 | 41 | dropped | 64 | 63 | dropped |
| 38 | 62 | 44 | 40 | dropped | 50 | 45 | dropped |
| 39 | 4 | 71 | 52 | 51 | 55 | 54 | 52 |
| 42 | 47 | 86 | 85 | 84 | 86 | 87 | 90 |
| **Totals** | **939** | | | | | | |
| | | **Range = 42-94** | **Range = 40-89** | **Range = 40-91** | **Range = 44-95** | **Range = 40-97** | **Range = 44-96** |

Late-successional forests are characterized by a complex forest structure. The proposed actions would occur within forests that generally lack a complex forest structure. Increasing tree species diversity, promoting understory vegetation, creating small openings, and maintaining and promoting a range of size and age classes would move these stands towards improving late-successional forest structure, with minimal short-term reductions in canopy cover.

Because Alternative C limits the size of trees that may be removed to a 20" dbh maximum, a larger number of smaller diameter trees would be removed under this alternative, than in Alternative A. The resulting stands would contain fewer small trees, less understory structure, and a cathedral-type stand with many medium-sized trees, rather than a multi-structured stand containing a variety of age and size classes. The more flexible prescriptions in Alternative A allow more opportunities to promote hardwoods by removing medium-sized trees (20 to 30 inches dbh), protect very large trees by thinning competing conifers from beneath them, and improve structural diversity within stands (vertical diversity) by thinning irregularly. Alternative C applies a more rigid silvicultural prescription of thinning only the smaller trees from below, which does not allow for adjustments to site-specific conditions to meet objectives for increasing within-stand or tree species diversity. By strictly thinning from below, Alternative C would leave a more homogeneous stand structure, which does not move stands towards the heterogeneous stand structure that is characteristic of late-successional forests as well as Alternative A. Alternative C also thins 163 fewer acres, which also results in reduced tree species and stand structure diversity as compared to Alternative A.

Alternative A better meets desired conditions for developing desirable late-successional forest structure by thinning more effectively to create small openings in forest stands for shade intolerant species such as hardwoods and pine to regenerate and persist, increasing tree species diversity by retaining a wider range of size classes, providing more opportunities to increase species diversity in stands and reduce competition around very large trees.

Alternative A is more likely to move stands towards their desired condition than Alternative C. This is because size class (i.e. less than 20 inches dbh) would not be the sole factor considered when marking individual trees for removal. Rather, trees can be selected for removal or retention based on a variety of additional characters—their size, species, health, decadent characteristics (heart rot, presence of cavities, mistletoe), competition with oaks, competition with very large trees—relative to other trees in the stand. This will provide more opportunities to create small openings for shade intolerant species to regenerate and persist, increase tree species diversity, and increase the diversity of tree sizes by retaining a wider range of size classes.

## Fire and Fuels:

### Alternatives A, C and D – Direct and Indirect Effects

### Mechanical Thinning Treatment Units

As described in Chapter II, Alternatives A and C propose mechanical thinning treatments while Alternatives B and D do not. The fire behavior predictions discussed in this section assume effects of the mechanical thinning treatments combined with the effects of the follow-up fuels treatments (either piling and burning or underburning) shown on Map A in Appendix A of this EA.

Flame length predictions (using BEHAVE, a fire modeling program) for both the current condition and the post treatment condition within the units proposed for mechanical thinning are described in the following table:

**Flame lengths within the units proposed for mechanical thinning treatments.**

| | Alternative A | | Alternative C | |
|---|---|---|---|---|
| | **Current Condition (acres)** | **Post-Treatment (acres)** | **Current Condition (acres)** | **Post-Treatment (acres)** |
| **0 to 4 feet** | 240 | 316 | 152 | 131 |
| **4 to 6 feet** | 235 | 97 | 230 | 79 |
| **> 6 feet** | 474 | 536 | 390 | 562 |

Alternative A would decrease the number of acres potentially producing 4 to 6 foot flame lengths in the event of a wildfire by approximately 59%. There would be an increase in acres potentially producing flame lengths greater than 6 feet of approximately 13%. This result would indicate that over 43% of the mechanically thinned acres under Alternative A would produce flame lengths low enough to allow initial attack of a wildfire by hand crews and engine modules. On the Yuba River Ranger District, the initial attack forces are made up of these types of resources. The time saved in waiting for mechanized equipment (dozers) to arrive could potentially result in smaller fires.

The Alternative C would reduce the number of acres potentially producing 4 to 6 foot flame lengths in the event of a wildfire by approximately 66%. There would be an increase in acres potentially producing flame lengths greater than 6 feet of approximately 44%. This result would indicate that over 27% of the mechanically thinned acres in Alternative C would produce flame lengths low enough to allow initial attack of a wildfire by hand crews and engine modules.

Rate of spread predictions for both the current condition and the post treatment condition within the units proposed for mechanical thinning are described in the following table:

**Rate of spread within the units proposed for mechanical thinning treatments.**

| | Alternative A | | Alternative C | |
|---|---|---|---|---|
| | **Current Condition (acres)** | **Post-Treatment (acres)** | **Current Condition (acres)** | **Post-Treatment (acres)** |
| **0 to 20 ch/hr** | 543 | 443 | 429 | 240 |
| **20 to 40 ch/hr** | 202 | 378 | 139 | 532 |
| **> 40 ch/hr** | 204 | 128 | 204 | 0 |

Alternative A shows an increase in Rates of Spread (ROS) of less than 40 ch/hr by 10%, and a decrease in ROS greater than 40 ch/hr by 37%. Alternative C shows an increase in Rates of Spread (ROS) of less than 40 ch/hr by 36%. There is, however, the elimination of rates of spread over 40 chains per hour in the 204 acres predicted to exceed that in the current condition of the units.

Fireline intensity predictions for both the current condition and the post treatment condition within the units proposed for mechanical thinning are described in the following table:

**Fireline intensity within the units proposed for mechanical thinning treatments.**

| | Alternative A | | Alternative C | |
|---|---|---|---|---|
| | **Current Condition (acres)** | **Post-Treatment (acres)** | **Current Condition (acres)** | **Post-Treatment (acres)** |
| **0 to 100 btu/ft/sec** | 211 | 287 | 123 | 131 |
| **100 to 500 btu/ft/sec** | 292 | 156 | 287 | 237 |
| **> 500 btu/ft/sec** | 446 | 506 | 362 | 404 |

Alternative A would decrease the number of acres potentially producing fireline intensities from 100 to 500 btu/ft/sec by approximately 47%. The reduction in acres potentially producing fireline intensities greater than 500 btu/ft/sec would be increased by approximately 13%. This result indicates that over 47% of the mechanically thinned acres under Alternative A would produce fireline intensities low enough to allow initial attack of a wildfire by hand crews and engine modules.

Alternative C would reduce the number of acres potentially producing fireline intensities from 100 to 500 btu/ft/sec by approximately 17%. The reduction in acres potentially producing fireline intensities greater than 500 btu/ft/sec would be increased by approximately 11%. This result indicates that over 48% of the mechanically thinned acres under Alternative C would produce fireline intensities low enough to allow initial attack of a wildfire by hand crews and engine modules.

Crown fire activity predictions for both the current condition and the post treatment condition within the units proposed for mechanical thinning are described in the following table:

**Crown fire potential within the units proposed for mechanical thinning treatments.**

| | Alternative A | | Alternative C | |
|---|---|---|---|---|
| | Current Condition (acres) | Post-Treatment (acres) | Current Condition (acres) | Post-Treatment (acres) |
| **Surface** | 636 | 777 | 627 | 627 |
| **Passive Crown** | 153 | 44 | 17 | 17 |
| **Active Crown** | 160 | 128 | 128 | 128 |

Alternative A would potentially result in all but 172 acres in the mechanical thinning units producing surface fire conditions in the event of a wildfire. This translates into greatly reduced potential for both tree mortality from torching and spotting from blown firebrands. Alternative C would potentially result in all but 145 acres in the mechanical thinning units producing surface fire conditions in the event of a wildfire. Alternative C shows no decrease in crown fire potential in the mechanical thinning units after treatment.

The increase in crown base height (CBH) in Alternative A is one of the main contributors to the change in the crown fire potential. This increase in distance between the surface fuels and the tree crowns is critical in bringing potential fires to the surface where they can more easily be suppressed. Alternative C also has an increase in overall CBH, however it does not exhibit the same change in crown fire potential as Alternative A. A possible explanation for this difference in change of crown fire potential could have to do with the heavier thinning of larger trees in Alternative A, thus giving a greater increase in CBH than Alternative C in which smaller diameter trees would be thinned.

When the above listed fire behavior descriptors are taken in combination, the resulting fire behavior in the area after treatment provides for safer and more effective firefighting. Additionally, the resource damage potential of a wildland fire in the mechanical thinning treatment units is greatly reduced.

**Fuels Treatment Units**

Fuels treatments under the Gold Project include cutting and piling of small ladder and surface fuels, mastication, and underburning as described in Chapter II.

Alternatives A, C, and D propose approximately 687 acres of hand cutting of small trees with follow up tractor piling (approximately 621 acres) or hand piling (approximately 65 acres) and subsequent burning of the piles. The units involved in this activity are currently considered densely growing stands of fir and pine, with dog hair thickets of small regeneration that act as fuel ladders. By thinning the understory (hand cut) trees up

to a 10-inch diameter, the crown base height in the treated areas would be raised. The cut trees would then be piled along with existing surface fuels. These two activities combined are very effective at reducing crown fire potential in densely stocked stands. Along with reduction in crown fire potential, generally speaking, the flame lengths would be shorter. With the removal of surface fuels, the overall fireline intensities of these stands would be reduced as well.

Alternatives A, C, and D propose mastication treatments on approximately 67 acres. The mastication in Unit C would break apart the existing live fuels and scatter the material along the surface. The action "rearranges" the fuel and allows for a reduced depth and increased compaction of the fuel bed. The new arrangement of the fuels bed inhibits sunlight from hitting the seedbed and allowing the brush to sprout. While there is an initial increase in fire line intensity in masticated areas, the rate of spread and flame length are decreased. This gives the opportunity for more suppression activities should a fire burn through a freshly masticated stand. As time goes on, the masticated material breaks down and loses compactness. As this happens, the opportunity for underburning the "rearranged" fuel bed arises. Fire line intensities decrease as rate of spread will increase and flame lengths remain the same.

Underburning would be accomplished on approximately 673 acres under Alternatives A, C, and D. Underburning allows for surface fuels reduction without disturbance or rearrangement to surface fuels. This "treatment in place" would reduce surface fuels and thus reduce rate of spread, flame length and fireline intensities in case of wildfire.

**Alternative B – Direct and Indirect Effects**

The proposed actions would not occur. There would be no change to the existing condition. The No-Action alternative would not meet the purpose and need of modifying fire behavior in the treated areas.

The project area would remain vulnerable to large, high intensity fires, because of the high recreational use within the Gold Project area. The majority of the fire starts within this area have been human-caused. The potential for damage to private property and natural resources from unwanted wildfires is high. When wildfires occur, torching, crowning, and spotting would make control efforts at the fire head ineffective. The fire line production rate would remain relatively slow for suppression modules due to slope and accessibility. Fire suppression would be difficult, control options would be limited to indirect attack, and the potential for an increase in acres burned would be high. Surface fire intensity may not increase, but residence time would and the potential for unwanted fire effects to soils, vegetation and watershed values would exist.

## Air Quality:

**Air Quality Effects of Alternatives A, C & D**

Predicted emissions from prescribed burning in the Gold Project area have been estimated using emission factors from EPA Document 42 and are based on an estimated 90% consumption of machine and hand piles. Assumptions used for determining emissions from timber operations and prescribed burns are:

- Emission factors used to determine effects from the project were taken from EPA Document 42 for prescribed burning, and from NEPA Air Quality Desk Reference Guide, Table 3.3.2-1 for timber harvest operations
- All harvest thinning equipment would be diesel powered.
- Harvest operations include harvesting, processing, skidding, loading, hauling, and road watering.
- Slash piles would be constructed free of dirt, with 90% consumption.

As shown in the tables below, burning of piles in Alternative A would produce a total of 3,736.47 tons of CO, 166.07 tons of VOC, 166.9 tons of NOx, and 332 tons of $PM_{10}$. Burning of piles in Alternative C would produce a total of 3,326.78 tons of CO, 147.86 tons of VOC, 148.60 tons of NOx, and 295.71 tons of $PM_{10}$. Underburning in both alternatives will produce the same emissions of 78.14 tons of CO, 4.34 tons of VOC, 3.49 tons of NOx, and 10.42 tons of $PM_{10.}$

**Criteria Pollutant Totals**
**Prescribed Burning (piles)**

**Alternative A**

| Year | CO (tons) | NOx (tons) | VOC (tons) | $PM_{10}$ (tons) |
|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 |
| **2** | 3736.47 | 166.9 | 166.07 | 332.13 |

**Alternatives C & D**

| Year | CO (tons) | NOx (tons) | VOC (tons) | $PM_{10}$ (tons) |
|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 |
| **2** | 3326.78 | 148.60 | 147.86 | 295.71 |

**Criteria Pollutant Totals**
**Prescribed Burning (underburn)**

**Alternatives A, C & D**

| Year | CO (tons) | NOx (tons) | VOC (tons) | $PM_{10}$ (tons) |
|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 |
| **2** | 78.14 | 3.49 | 4.34 | 10.42 |

Temporary and short-term visibility impacts can be expected in the immediate project area during actual ignition and would be affected by wind speed and direction. Drainage inversions would affect nighttime dispersal of smoke, with possible smoke effects 5 to 10 miles down canyon. Smoke from burning forest fuels can impact human health, particularly for the ground crews at the site. The localized effects of burning in the Gold Project area would be short-term degradation of air quality from prescribed burning, primarily during the burnout stage and during nighttime canyon inversions. The prescribed pile and under burning associated with the selected alternative would be conducted in accordance with a smoke management plan approved by the Nevada Sierra County Air Quality Management District. The smoke management plan would prescribe weather conditions (mixing heights and transport winds) that would avoid, as much as possible, smoke effects in Downieville and Sierra City, both populated centers.

Predicted emissions from the Gold project harvest operations in Alternative A are 3.87 tons of CO, 0.48 tons of VOCs, 6.62 tons of NOx, and 0.49 tons of $PM_{10}$. Predicted emissions from the Gold project harvest operations in Alternative C is 1.81 tons of CO, 0.28 tons of VOCs, 3.64 tons of NOx, and 0.28 tons of $PM_{10}$. Dust created by logging, hauling operations, and tractor yarding can also affect $PM_{10}$ concentrations. Dust abatement measures would be used to mitigate fugitive dust effects from these areas during implementation of the proposed action.

**Criteria Pollutant Totals**
**Thinning Operations**

**Alternative A**

| Year | CO (tons) | NOx (tons) | VOC (tons) | $PM_{10}$ (tons) |
|---|---|---|---|---|
| **1** | 3.87 | 6.62 | 0.48 | 0.49 |
| **2** | 0 | 0 | 0 | 0 |

**Alternative C**

| Year | CO (tons) | NOx (tons) | VOC (tons) | $PM_{10}$ (tons) |
|---|---|---|---|---|
| **1** | 1.81 | 3.64 | 0.28 | 0.28 |
| **2** | 0 | 0 | 0 | 0 |

If a wildfire event does occur after project implementation of the Proposed Action, concentrations of all smoke related emissions would be expected to be less than in Alternative B due to the reduced levels of fuel available. Prescribed burning activities for all projects are coordinated with the state and local air quality agencies to ensure that atmospheric stability and mixing heights are advantageous for dispersion of emissions. Therefore, expected effects from the proposed prescribed burning activities would not exceed state and local air quality standards.

**Criteria Pollutant Totals**

**Alternative A**

| Year | CO (tons) | NOx (tons) | VOC (tons) | $PM_{10}$ (tons) |
|---|---|---|---|---|
| **1** | 3.87 | 6.62 | 0.48 | 0.49 |
| **2** | 3814.61 | 170.39 | 170.41 | 342.55 |

**Alternative C**

| Year | CO (tons) | NOx (tons) | VOC (tons) | $PM_{10}$ (tons) |
|---|---|---|---|---|
| **1** | 1.81 | 3.64 | 0.28 | 0.28 |
| **2** | 3404.92 | 152.09 | 152.2 | 306.13 |

**Alternative D**

| Year | CO (tons) | NOx (tons) | VOC (tons) | $PM_{10}$ (tons) |
|---|---|---|---|---|
| **1** | 0 | 0 | 0 | 0 |
| **2** | 3404.92 | 152.09 | 152.2 | 306.13 |

Timber operations are estimated to take one operating season to complete. Burning of the prepared units will occur over a one to two year period after the first season of timber operations. Staging of the pile burning over this period would ensure compliance with federally mandated annual threshold levels for ozone precursors (VOC and/or NOx). The proposed action is in conformity with the state implementation plan and, therefore, further air quality analysis is not required.

**Air Quality - Effects of No Action**

Under this alternative, no increase in ozone precursors or $PM_{10}$ emission levels would be produced from prescribed burning of activity generated fuels, harvest operations, or understory burning. Potential for substantial degradation of air quality from wildfire in the future as surface fuel deposition occurs would not be reduced. The No Action Alternative will not provide any opportunities to reduce existing forest fuels and the hazard they pose in wildland fires. During the flaming phase of a catastrophic wildfire, air quality degradation can exceed Federal and State standards as far as 50 miles downwind. Forest fuels would continue to increase with biomass production out-producing the decomposition rates in this climate. Long term chronic effects of wildfires include, higher $PM_{10}$ emissions, mostly due to large areas of exposed soil and ash in the aftermath of a high intensity wildfire.

## Forest Vegetation:

### Alternative A - Direct Effects on Vegetation

#### *Effects of Thinning*

The Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA ROD 2004) allows reductions of up to 30 percent from existing canopy cover (SNFPA ROD page 50), but it requires canopy cover retention of at least 50 percent in most situations. The SNFPA ROD does allow canopy cover to be reduced to 40 percent where site-specific project objectives cannot otherwise be met (SEIS volume 1, page 247). Canopy cover requirements apply to all mature forest habitats outside the Wildland Urban Intermix (WUI) Defense Zone.

The SNFPA ROD (page 50) specifies that within mature forest habitat outside the Defense Zone, projects will retain at least 40 percent of the existing basal area generally comprised of the largest trees. Implementing thinning under this direction would result in upper diameter limits of anywhere from 14 to 29 inches dbh. Where diameter limits are less than 29 inches dbh, an occasional tree larger than the diameter limit but less than 30 inches dbh may be removed to release black oak or to create ¼-acre openings. In these situations, the 40 percent basal area retention would be made up in other parts of the stand. No trees larger than 29 inches dbh would be removed unless determined to be hazard trees (see hazard tree marking guidelines in Appendix D) or conifers within aspen stands. Additionally, except for equipment operability, no hardwoods would be removed. The SNFPA ROD (page 50) also specifies that, where available, projects will be designed to retain 5 percent or more of the total treatment area in lower layers comprised of trees 6 to 24 inches dbh. Thinning prescriptions retain at least this amount in all stands.

Mechanical thinning is proposed where a more diverse stand structure (both vertically and horizontally) is desired, stand densities are high and considered at risk for insect attack, conifers are overtopping and suppressing black oak, conifers are encroaching on aspen stands, and/or where overcrowded conditions may contribute to future wildfire intensity. Thinning would focus on reducing both ladder and crown fuels resulting in an increase in the vertical and horizontal distance between tree crowns; however, in most areas clumpiness is encouraged (See marking guidelines in Appendix D). Where the opportunity exists, thinning would promote a more diverse species composition in white fir dominated stands. Age class and size class diversity would also be encouraged where appropriate in even-aged or even-sized stands. Unless determined to be a safety hazard, snags and large downed logs would be retained.

The objectives for thinning concentrate on enhancing structural diversity and horizontal heterogeneity. According to Jerry Franklin (2001), structurally diverse means that there is a rich variety of individual structures, including a variety of tree sizes, conditions, and species--including some large, old trees with their individualistic canopies, decadence, and large branch systems. Structurally diverse also means that there is a high degree of

spatial variability in structure in both the vertical and horizontal dimensions. Horizontal heterogeneity means that there is a high degree of spatial patterning within the stands visible as structural patches, including canopy gaps (openings) and areas with high stem densities (Franklin 2001).

Typically, thinning from below tends to create stands with uniformly-spaced, large diameter trees. This type of structure may be desirable if fuels reduction is the primary goal. However, this type of structure may not meet wildlife or silvicultural (i.e. regeneration) objectives. Alternative A attempts to create more variability in stand structure to provide for wildlife habitat objectives, while at the same time meeting stand health objectives. These objectives would be accomplished in a number of ways such as through the selection of leave trees, thinning around individual and groups of black oak, creating small (1/4 acre) canopy gaps, retaining clumps or aggregations of large trees, large tree enhancement, protection of pockets of regeneration, and leave buffers along streams. In some cases, thinning prescriptions would allow a larger tree to be removed to retain a smaller but healthier tree or a tree of a more desirable species, enhancing both structural (vertical layering) and species diversity. Thinning around healthy black oak and large conifers would not only enhance growth and crown development, but it would create more variability in tree distribution by creating canopy gaps around these trees. Additional canopy gaps would be located adjacent to large tree clumps or natural gaps caused by insect or disease related mortality. In selected stands where the predominant species is red fir, the creation of ¼-acre gaps would be the only harvest treatment, promoting more structure in single storied stands.

During tree removal operations, some damage to residual trees would be unavoidable. Tree injuries could create opportunities for insects and disease. However, through careful logging practices that minimize both wounding of residuals and site disturbance, damage to residual trees would be minimal. Also, downed woody material or slash that is produced during thinning may promote the activity of *Ips spp.* (Owen 1991). Whole tree yarding to landings in tractor units would remove most of the slash along with the boles of the trees. Recommendations in aerially logged units are to lop and scatter (exposing to the sun) logging slash down to 3 inches in diameter and to less than 18 inches above the surface of the ground (Shea and Ostergaard 1997). The objective of this treatment is to dry out the phloem of the slash, thereby making it unsuitable for production of *Ips. spp*. brood (offspring).

### *Effects of Plantation Thinning*

Plantation thinning would reduce stocking levels to between 180 to 360 trees per acre. Species other than true fir would be favored in leave tree selection to improve diversity. Hardwoods would not be cut. Trees and limbs would be cut to lengths of 4 feet or less and slash depth would be reduced to 18 inches by lopping and scattering of cut material. Slash within 50 feet of system roads would be pulled to the road and chipped. The chips would be spread back on the site with no areas having chips more than 6 inches deep. No thinning would occur within the riparian buffers in RCAs.

The direct effects of plantation thinning would be an increase in sunlight, moisture, and soil nutrients available for tree growth and enhanced wildlife habitat through developing diverse stand structure. Thinning would also release black oak from conifer competition.

### *Effects of Site Prep and Reforestation*

Mechanical site preparation for planting would be accomplished by excavator piling of shrubs and down fuel concentrations. Piles would be burned in the fall. An average of 50 percent effective ground cover would be maintained across the treated area. Conifer seedlings would be planted in clusters of three trees (4 to 6 feet apart) at an average of 25 foot spacing between clusters. Planting would preferably occur in the fall although spring planting would be done if fall conditions were not optimum. Species planted would include a mixture of ponderosa pine/Jeffrey pine, Douglas-fir, incense-cedar, and sugar pine. True fir would seed in naturally. Seedlings would be planted with a control release fertilizer packet to help the seedlings compete with other vegetation. Approximately 4 ounces of soil from a nearby forested site would be placed in the hole with the seedling. This method is used to inoculate the soil with fungi called mycorrhizae that have a mutually beneficial relationship with plant roots. The seedlings would have a 5-foot radial grub 2 to 3 summers following planting. No operations would occur within the riparian buffers in RCAs.

On areas without enough shrub cover or fuels concentrations to warrant piling, tree planting would proceed as above without mechanical site prep. The seedlings would have a minimum 5-foot radial grub the summer following planting. One more manual release treatment may be performed if necessary.

The direct effects of site prep and planting would be to reforest understocked areas with conifers and increase species diversity.

### *Effects of Aspen Restoration*

To ensure for maximum sun exposure to aspen roots while balancing protection to adjacent conifer stands, the treatment area is identified as a distance surrounding the aspen stand (or where living aspen trees or sprouts are present): 1.5 tree heights on the east and west sides of the aspen stand, 2 tree heights from the south side of the aspen stand, and 1 tree height on the north side.

Small (less than 10 inches in diameter) conifers would be cut from within and around aspens. All slash disposal activities would be coordinated with a biologist, to protect the aspen stand. In addition, cut material within the aspen stand would be used to create cover piles or log structures for small mammals, (2) strategically scattered throughout the aspen stand (generally not to exceed 50 percent of the ground surface) to discourage browsing on aspen shoots that have terminal leaders that are less than 7 feet tall, and (3) excess slash would be piled outside of the aspen stand and burned. Where commercial opportunities are available, conifers 10 inches dbh and greater would be yarded to

landings using aerial methods. Slash disposal activities would be coordinated with a fuels specialist, hydrologist, and a biologist on a site specific basis.

Where commercial opportunities are not available, or where conifer removal may not occur due to potential site-specific resource concerns, conifers could be reduced by the following methods: (1) fell and retain on the ground as dead wood, or (2) girdle a proportion of existing trees to create snags. To address potential resource concerns, trees identified for either: (a) felling and leaving on site or (b) girdling would be coordinated among resource specialists.

All existing legacy trees within the aspen restoration treatment units would be retained. Legacy trees would be identified, using general guidelines available in *A Tree Classification for the Selection Forests of the Sierra Nevada* (Duncan Dunning 1928), *Growth Classification Systems for Red Fir and White Fir in Northern California* (George T. Ferrell 1983), and personal communication with an ecologist (JoAnn Fites 2009). If legacy trees are not present, for all aspen stands that exceed 5 acres in area, two trees per acre of the largest trees equal to or greater than 30 inches dbh would be retained. Existing snags equal to or greater than 20 inches dbh and 15 feet high would be protected where it does not compromise safety.

The direct effects of the removal of conifer competition from within and around aspen stands is increased sunlight available to residual aspen trees and sprouts, resulting in increased health, growth, and regeneration of aspen stands.

***Effects of Hazard Tree Removal***

Hazard trees would be removed from within thinning units. The direct effects to vegetation of removing hazard trees would be minimal, consisting of some injury and breakage through falling and yarding operations.

***Effects of Tractor Piling, Mastication, Hand Thinning, and Underburning***

Understory treatments would include tractor piling and burning, mastication, underburning, hand thinning of small less than 10" dbh trees and brush, and hand clearing of small conifers around oaks. Tractor piling would remove surface and ladder fuels by piling severed small conifers, brush, slash and debris to be burned during periods of low fire danger. Mastication would remove small trees generally less than 10" dbh and shrubs. Mastication of trees and shrubs would reduce ladder fuels, and release the remaining trees from competition for water, soil nutrients, and sunlight, thus increasing health and tree growth. Most of the shrub species cut during mastication would resprout by the next growing season. Underburning would remove shrubs and small trees (mostly less than 4 inches dbh, but occasionally up to 8 inches dbh in dense pockets). Some overstory conifer mortality may occur in isolated areas because of cambial damage and torching, but mortality in larger trees would be minimal. Hand thinning treatments would have results similar to mastication, except that the cut material would be piled and burned rather than mechanically treated and left on site. Hand clearing around oaks would

remove conifers less than 10" dbh that compete with hardwoods for sunlight, water and soil nutrients. This treatment would help ensure oak presence as a part of the species composition in mixed conifer stands.

***Effects of Prescribed Burning***

*Hardwoods* - California black oak (*Quercus kelloggii*) is fire sensitive. The outer bark chars readily, and the cambium suffers heat damage even where bark is thick (Howard 1992). The amount of damage sustained by surface fire depends upon fire severity. A large percentage of black oaks are completely killed following severe surface fire. Moderate-severity fire typically produces localized charring and cambium death in an older trunk, while other trunk portions remain undamaged. A moderate-severity fire would kill approximately half of all young trees in a stand, while most others would be top-killed. Low-severity fire causes some cambium damage to trees pole-sized and under. Spring fires corresponding to the active growing season result in greater tissue damage than fire during other seasons (Howard 1992).

Underburning would reduce the vegetative competition and may result in seedling-sprouts more vigorous and of better form than the original seedlings. Fire would kill the advance oak reproduction back to ground line. The oak would probably sprout from the root crown, often with only one stem, and quickly grow back to browse height (Tappeiner and McDonald 1979).

Above ground foliage of canyon live oak (*Quercus chrysolepis*) is fire sensitive, and it is generally top-killed by fires of even relatively low intensity (Green 1980). Even light ground fires can seriously damage or girdle this oak (Plumb and McDonald 1981). It is its flaky outer bark that contributes to its destruction (Plumb and McDonald 1981). After fire, canyon live oak generally sprouts prolifically (Tesch and Hobbs 1986).

*Conifers* - Underburning would benefit stand health by killing many suppressed understory trees, thus reducing ladder fuels and inter-tree competition. Additionally, underburning would help to increase structural diversity by producing a patchy kill pattern. Underburning would kill more incense-cedar, white fir, sugar pine, and Douglas-fir saplings than ponderosa pine because they have very thin bark comparatively. Damage to larger trees from underburning would be moderate in white fir dominated stands and minimal in stands with a more diverse species composition. Past experience with underburning in white fir stands has shown that the extent of fire related mortality is often not immediately apparent, but can continue for 10 or more years after burning. Fire related mortality in larger trees can be mitigated somewhat by clearing away large fuels and raking back duff and bark sluff around tree boles or by creating a fireline around the tree bole below the dripline of the crown (Reardon et al. 2007). Conifers damaged by burning may later succumb to insects or disease.

*Shrubs* - Depending on the season and conditions of burning, most shrub species would only be top killed. After burning, recovery of these shrub species would occur mainly through sprouting.

**Alternative A - Indirect Effects on Vegetation**

*Thinning* - The indirect effects of thinning would include improved tree health and vigor, resulting in an increased resistance to insects and disease, improved growth rates, and less density related mortality. In stands with a hardwood component, thinning of conifers from around black oak would increase the amount of sunlight reaching tree crowns, thus helping to ensure survival and promote better crown development and seedling establishment. North and others (2009) affirm that provisions are needed to create open areas within stands to facilitate hardwood recruitment. Additionally, they state that thinning around large oaks that are prolific seed producers creates open conditions that favor oak regeneration. Thinning around selected large diameter conifers (> 29" dbh) would increase growth and resistance to insects and disease.

Recent studies in ponderosa pine stands in Oregon confirm that stand density reductions result in increased growth of large old trees. Furthermore, they show that a physiological response to stand density reductions can last for up to 15 years (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003). Contrary to the belief of some foresters and scientists, this new information shows that at the individual level, old trees have the potential to increase growth dramatically after stand density reductions. Additionally, Waring & Pitman (1985) found a large increase in mountain pine beetle (*Dendroctonus ponderosae*) resistance of old lodgepole pine *(Pinus contorta)* stands within one year after thinning. What this means is that forest managers can effectively manipulate old-growth stands on an infrequent basis (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003). The advantages to the old-growth ecosystems are that susceptibility to fires, insects, and drought can be mitigated, and tree-level productivity can be enhanced with minimal mechanical damage associated with the harvest (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003). Increases in growth are not immediately apparent, however. This same study found that there was about a four-year lag period in growth response after thinning (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003). The authors speculate that this lag is associated with increased root growth.

*Development of Large Snags* - Based on the previously mentioned studies in ponderosa pine stands (N. McDowell, J. R. Brooks, S. A. Fitzgerald, and B. J. Bond 2003), thinning around large diameter pine can increase growth and health for up to 15 years with a lag period of about four years. Consequently, there could be at least a 15 to 20 year increase in longevity of large pine, or conversely, a 15 to 20 year delay in mortality of large pine under proposed thinning treatments. A similar increase in longevity would be expected in other large diameter conifers such as Douglas-fir and Sugar pine.

*Plantations* - The indirect effects of plantation thinning would be increased tree health and growth levels, less density related mortality, enhanced wildlife habitat through developing older forest characteristics such as large diameter trees, more diverse stand structure, relatively high canopy closure, and more fire resilient forested stands. Thinning would also increase oak growth and health.

*Conifer Regeneration* - The indirect effects of site prep and planting would be an increased percentage of the project area in a forested condition in less time than had no treatment occurred. Additionally, the forested stands would be more resilient because of increased species diversity over what would occur naturally.

*Aspen Stands* - The indirect effects of removing conifers within and around aspen stands is that aspen growth and regeneration would increase, improving habitat for wildlife and increasing species diversity in forested stands.

*Understory Treatments* - The indirect effects of tractor piling, mastication, hand thinning, and underburning on trees would be that more water, sunlight, and soil nutrients would be available for tree growth. As a result, trees would be healthier and less likely to succumb to insect attack.

The indirect effects of underburning on shrubs would be that after burning, fire adapted species would regenerate. Species such as tan oak, chinquapin, huckleberry oak, Pacific dogwood, bitter cherry, greenleaf manzanita, and deer brush sprout vigorously from the root crown after burning. In species such as whitethorn, deer brush, and greenleaf manzanita, fire would also stimulate germination of buried seed.

*Stand Density Index (SDI)* - Stand Density Index (SDI) represents an effective tool with which to translate growing stock objectives into density management prescriptions. The utility of SDI results from the ability to compare levels of growing stock (and thus competitive stress, degree of site occupancy and growth as a percent of potential) regardless of differences in site quality or stand age. Thus, SDI was selected as one way to measure the effectiveness of the proposed treatments.

Jim Long (Smith and Long 2003) recommends using a maximum SDI of 600 (theoretical boundary line for a species) for mixed conifer stands on the Yuba River Ranger District. This maximum SDI reflects a desired condition that maintains some early seral species such as ponderosa pine in forested stands. Other maximum SDIs (red fir, white fir, and black oak) used for this analysis were based on those used in the mortality model for the Western Sierra Nevada Variant of FVS (February 1994) (For further information about the Maximum SDIs used in this analysis, see table in Appendix D). Long (1985) suggests managing for an SDI of less than or equal to 60 percent of the maximum SDI for stands largely free from self-thinning. Additionally, the Regional Forester's letter (2004) states that when designing thinnings, ensure that density does not exceed an upper limit (90% of normal basal area, or 60% of maximum stand density index) to avoid the health risks associated with density. It also directs managers to "design thinnings to ensure that this level will not be reached again for at least 20 years after thinning." A lower level of 35 percent maximum SDI would maintain full site occupancy. The aim is to maintain stands between the upper and lower SDI levels of 35 and 60 percent maximum SDI to maintain stand health and productivity at optimal levels. Still other objectives, in addition to the ones in the 2004 SNFPA ROD, such as maintaining high levels of canopy cover for wildlife habitat, can make these SDI goals difficult to achieve.

*SDI Effects Comparison with Alternatives A and B* - FVS was used to compare SDI levels immediately after the proposed mechanical thinning treatments and then at 10-year intervals up to 20 years for all treatments. SDI levels after thinning were reduced to or below the recommended 60 percent of maximum SDI on about 460 of the 940 acres if mechanical thinning treatments alone were applied. However, when mechanical thinning was combined with understory hand thinning treatments to evaluate long-term effectiveness, after ten years, 517 acres were still at or below 60 percent Max SDI (with the assumption that understory hand thinning treatments would occur during the10-year period after the mechanical thinning treatments). After 20 years, about 380 acres would still meet the recommendation. Without treatment, if the current condition continued, barring a catastrophic wildfire or insect infestation, about 86 of the acres proposed for thinning would be at or below the recommended level in 10 years. At 20 years, 73 acres would be below the recommendations.

Because of other management objectives, such as canopy cover, basal area retention, and hardwood retention, SDIs in some stands would remain higher after thinning than those recommended. However, the proposed treatments would meet Forest Plan standards and guidelines for mechanical thinning treatments as well as the project objectives, as the primary intent is to move the project area toward the desired condition. While some of the area may not fully achieve the desired density levels after proposed treatments, this area would be in a healthier condition and less likely to suffer large losses to insect mortality. Additionally, project objectives aimed at increasing structural diversity would be met on all of the acres commercially thinned.

*Insects and Disease*

*Natural Stands* - As recommended in the Regional Forester's letter (2004), where stands are maintained at or below the suggested 60 percent maximum SDI, risk for insect infestation is minimized. Sheri Smith, Zone Entomologist, states that thinning is the most important silvicultural tool available to maintain or restore tree health and increase resistance to insect attack. However, because it places an additional stress on trees, thinning during non-drought periods is preferred rather than waiting until mortality is detected (Smith 1997).

While thinning increases the health of trees, it may aggravate disease conditions, such as annosus root disease. Annosus root disease is a normal part of most forest ecosystems in the West contributing to structural composition and diversity. Studies have shown the incidence of annosus root disease to be higher in stands that were partially cut (Schmitt et al. 2000). Especially when thinning in white fir dominated stands, care must be taken to minimize wounding of residuals, which create entry sites for disease. Thinning white fir stands with annosus root disease may reduce disease impacts by increasing vigor in the residuals; however, this strategy has not been well researched (Schmitt et al. 2000).

Recommendations from the Zone Entomologist (on file at the Yuba River Ranger District office) are to utilize small group selections to remove root disease pockets and clumps of trees with heavy dwarf mistletoe infections. In this project, openings created through

timber harvesting would generally not exceed ¼ acre in size. Even though natural regeneration would occur within the openings, the purpose for creating openings is not for conifer regeneration. The purpose of these openings is to increase structural diversity. Additionally, the gaps would not be large enough to provide sufficient sunlight to regenerate shade intolerant conifers such as pine species (York et al. 2004). It is also recommended that a registered borate compound be applied to all freshly cut conifer stumps greater than 14" dbh in order to reduce the chance of new infection centers forming following harvest activity. However, treatment of stumps is not recommended for stands already having high levels of annosus root disease infection. Furthermore, in the annosus root disease survey in the Washington Project Analysis (on file at the District office), the pathologist recommended borate application only in stands with no indications of annosus root disease presence. Likewise, for this project only true fir stands with no indication of root disease would be treated with borate compound (see Chapter II, Table 2-1. Management Requirements).

*Shrubs* - Thinning would result in an increase in existing shrub growth primarily because of increased light levels, and especially within the ¼ acre openings where burning would occur. Additionally, ground disturbance on skid trails, in combination with increased light levels, would promote the germination of stored seed in some places. Similarly, underburning would stimulate germination of stored seed. Rate of growth for new shrubs would vary depending on species, canopy cover, and amount of light required by the plant for maximum growth.

**Alternative B - Direct Effects on Vegetation**

Alternative B would not meet the purpose and need of enhancing forest health. Thinning of mature trees (> 10" dbh) and hand cutting, tractor piling, and mastication of shrubs and smaller trees would not occur. Additionally, prescribed burns would not reintroduce fire into the landscape. Overstocked slow growing stands of trees would continue to experience reduced tree vigor and competition induced stress resulting in tree mortality. Stands with heavy ladder fuels and dense conifer and shrub understories that could contribute to crown fire initiation would persist. Hazard trees would not be removed to protect forest visitors, residents, and Forest Service employees. Consequently, the present condition within the Gold project area would not move closer to achieving the desired condition.

*Plantations* - Similar to natural stands, tree health would decrease in overcrowded plantations making them more susceptible to insects and disease. Additionally, as tree canopies close, shrubs would eventually succumb to competition for site resources. Consequently, dead trees and shrubs would add to the future surface fuel loadings.

*Conifer Regeneration* - Understocked stands would continue to be understocked with conifers until natural regeneration is able to re-establish itself on the site.

*Aspen Stands* - Conifers would continue to compete with aspen for site resources. Aspen stands would continue to decline in health and size.

**Alternative B - Indirect Effects on Vegetation**

If Alternative B is selected, stand densities would continue to increase in the absence of wildfire or other major disturbance (i.e. insects, disease, and wind). Tree growth would continue at progressively reduced rates in heavily stocked stands. Where openings in the canopy exist, canopy cover would gradually increase resulting in a reduction of shrubs in these areas. Conifers would continue to overtop and shade out black oak in mixed conifer stands. While this process naturally occurs over time until some type of disturbance occurs (insects, disease, fire, or blowdown), it may be desirable to retain black oak as a component of the stand for structural diversity and other wildlife habitat values.

*Stand Density Index (SDI)* - Currently, about 97 percent (913 acres) of the area proposed for thinning is over the threshold (60% of maximum SDI) where competition induced mortality begins (Smith and Long 2003). In 10 years, without a major disturbance about 91 percent (854 acres) of the area (see table in Appendix D) would still exceed these stand density levels. The decrease in the percentage of the area over threshold would be due to density related tree mortality or self-thinning. In 20 years, 92 percent (867 acres) of the area would exceed recommended stand density levels. As a result, numbers of snags and downed logs would be expected to increase, as would surface fuel loadings. This increase in snags would include both large and small snags. Thus, Alternative B would result in the creation of snags at a faster rate than the action alternatives. Additionally, the growth of shade intolerant conifers would increase within openings created from tree mortality.

*Insects and Disease*

*Natural Stands* - Without thinning, it is likely that insect mortality would increase as stand density increases. The insect most likely to become problematic in natural stands within the project area is the fir engraver (*Scolytus ventralis*). The fir engraver is the primary agent of mortality in white and red fir dominated stands. Under adequate moisture regimes, overstocking of fir stands and high infection rates by root disease are the principle factors involved in predisposing trees to attack by the fir engraver (Smith 1997). On the west side of the Sierra Nevada, most fir engraver-related mortality occurs during prolonged periods of drought. Mortality usually appears as single trees scattered over several acres.

*Plantations* - Within plantations, growth would slow and density related mortality would increase. Densely stocked plantation trees would become increasingly susceptible to insects as stress from competition for resources increases. The resulting dead trees would add to existing surface fuel loadings.

*Conifer Regeneration* - Naturally regenerating conifers would be mostly true fir as true fir is the predominant overstory tree species in the project area. Additionally, true fir is capable of growing under shrub cover and eventually overtopping them where other more

shade-intolerant conifers cannot (Gordon 1970). Thus, in areas where shrubs predominate, without some type of disturbance, naturally regenerating true fir seedlings would eventually overtop the shrubs and shade them out.

*Aspen Stands* - Aspen health and growth would continue to decline as conifers compete with them for sunlight. As conifer regeneration encroaches into the aspen stand, aspen regeneration would continue to decline. Without wildfire or insect infestation, conifers would eventually out-compete the aspen.

*Shrubs* - Shrub growth would decrease in some areas and increase in others. Shrub growth would decrease and shrubs would eventually die as tree canopies close in areas that were once open. Conversely, shrub growth would increase within the openings created from tree mortality.

**Alternative C - Direct Effects on Vegetation**

*Thinning* - Alternative C follows direction in the 2001 Sierra Nevada Forest Plan Amendment Record of Decision. The direct effects of Alternative C would be similar to Alternative A with the exception of several thinning units dropping out. Thinning units 13, 17, 35, 36, 37, and 38 would not be treated under Alternative C because of the lack of trees in the available diameter classes and the difficulty in implementing the gap prescription with diameter limits of 11 and 20 inches dbh. Additionally, because of the changes in diameter limits for tree removal, most of the units proposed for ¼ acre gaps would change to thinning from below type prescriptions. Another difference is that Alternative C would keep at least 50 percent canopy cover outside of the Defense Zone (see tables in Appendix D).

*Stand Structure* - One of the primary differences between Alternative C and A would be in the stand structure resulting from thinning. Alternative C prescriptions concentrate on the reduction of ladder fuels through thinning from below. These prescriptions tend to create single storied stands of trees that have a "park-like" appearance (i.e. larger trees with a clean understory and little structure). In contrast, Alternative A attempts to create structural diversity in tree sizes and tree distribution, to the extent that 2004 SNFPA ROD standards and guidelines allow.

*Plantations and Reforestation* - The effects of the proposed treatments would be the same as in Alternative A.

*Aspen* - The effects of the proposed treatments would be the same as in Alternative A.

*Hazard Tree Removal* - Hazard tree removal would have the same effects as in Alternative A.

*Tractor Piling, Mastication, Hand Thinning, and Underburning* - Understory treatment effects would be similar in both Alternatives C and A. The combination of thinning from below and the treatment of understory fuels would create more park-like conditions in

Alternative C than under Alternative A where the objective is to create more structural diversity. Two thinning units (Units 35 and 38) that would not be mechanically thinned under Alternative C would receive hand thinning, tractor piling, and pile burning (Unit 38) and underburning (Unit 35) treatments. The direct effect of these understory treatments would be a reduction in surface and ladder fuels.

**Alternative C- Indirect Effects on Vegetation**

*Thinning* - Within individual units, the indirect effects of Alternative C would be similar to Alternative A except that all trees larger than 20 inches dbh, and in some cases larger than 11 inches, would be left outside of the Defense Zone (except for hazard trees and conifers within aspen stands). There would also be differences in residual canopy cover between the two action alternatives, with Alternative C retaining at least 50 percent in all proposed thinning units outside of the Defense Zone.

Post treatment stand density differs between Alternative C and A within stands proposed for thinning. While thinning would result in increased tree health and vigor, the increase would not be as great in Alternative C (see table in Appendix D). Alternative C would maintain health and vigor of trees over a greater area for a longer period of time (20 years) than Alternative B, however.

*SDI Comparison of Alternatives A, B, and C* - FVS was used to compare SDI levels for the three alternatives immediately after thinning and then again at 10 and 20 years after all mechanical treatments have been implemented. For the comparison, maximum stand density indices (max SDIs) of 382 (oak), 600 (mixed conifer), 759 (white fir), and 800 (red fir) and the Regional Forester's recommendation to keep stands at or below 60 percent maximum SDI were used.

Differences between the alternatives were apparent immediately after thinning and at 10 and 20-year intervals. After mechanical thinning, SDI levels for Alternative C were at or below recommended levels on 153 acres, as opposed to 460 acres in Alternative A. After 10 years, 146 acres were still below the recommended density levels in Alternative C, while 517 acres were below that level in Alternative A. After 20 years, Alternative C still maintained 129 acres at the recommended density level. Alternative A maintained 380 acres at the recommended density levels after 20 years. For Alternative B, 86 acres were below the recommendation in 10 years and 73 acres in 20 years.

From this comparison, it would appear that Alternative A better meets stand density objectives, and thus would have a lower risk for insect infestation for a longer period of time, than either Alternative B or C.

*Plantations and Reforestation* - The effects of the proposed treatments would be the same as in Alternative A.

*Aspen* - The effects of the proposed treatments would be the same as in Alternative A.

*Hazard Tree Removal* - Hazard tree removal would have the same effects as in Alternative A.

*Tractor Piling, Mastication, Hand Thinning, and Underburning* - The indirect effects of understory treatments would be the same as Alternative A.

*Shrubs* - The indirect effects of proposed treatments on shrubs would be the same as Alternative A.

**Alternative D- Direct Effects on Vegetation**

*Understory Thinning*

Alternative D complies with the requirement to include a noncommercial funding alternative at the project level. This alternative's sole purpose is to achieve the fuels reduction element of the purpose and need. The direct effects of Alternative D would be the same as Alternative A for those areas where only fuels treatments are proposed (approximately 55 acres of mechanical mastication, 406 acres of hand thinning and tractor piling, and 558 acres of underburning). Where both mechanical thinning and fuels treatments in Alternative A overlap, the effects would differ in Alternative D, with only the fuels treatments implemented under Alternative D. For all other areas, the effects of implementing Alternative D would be the same as Alternative B, the no action alternative.

*Stand Structure*

One of the primary differences between Alternative D and the other action alternatives is in the stand structure resulting from thinning. Alternative D prescriptions would only remove ladder fuels through thinning trees less than 10 inches dbh (or to the extent necessary for operability). These prescriptions tend to create single storied stands with little structural diversity and a continuous overstory canopy layer. Alternative C would also tend to create single storied stands; however, there would be more flexibility to meet stand structural diversity objectives because of the higher diameter limits. In contrast, Alternative A attempts to create and enhance stand structural diversity through the creation of clumps and gaps in the forest canopy.

*Plantations and Reforestation*

The effects to plantations would be the same as Alternative B, the no action alternative. Proposed site preparation and reforestation would not occur, as in Alternative B.

*Aspen Restoration*

The effects to aspen stands would be the same as Alternative B.

*Hazard Tree Removal*

Hazard tree removal would have the same effects as Alternative B.

*Tractor Piling, Mastication, Hand Thinning, and Underburning*

The effects of understory treatments in Alternative D would be the same as in Alternatives A and C where only understory treatments are proposed. Where mechanical thinning and understory fuels treatments are proposed in the same unit in Alternative A, understory treatments would still be implemented under Alternative D. The direct effect would be a reduction in surface and ladder fuels.

**Alternative D - Indirect Effects on Vegetation**

*Stand Density*

Post treatment stand density differs between the action alternatives within stands proposed for tree removal. While thinning would result in increased tree health and vigor, the increase would generally not be as great both within stands and at a landscape scale in Alternative D (see table in Appendix D of the EA). Alternative D would maintain health and vigor of trees over a greater area for a longer period of time than Alternative B, however.

*SDI Comparison of Alternatives A, B, C, and D*

FVS was used to compare SDI levels for the four alternatives immediately after thinning, and then again at 10 and 20 years after all mechanical treatments have been implemented. For the comparison, maximum stand density indices (max SDIs) of 382 (oak), 600 (mixed conifer), 759 (white fir), and 800 (red fir) and the Regional Forester's recommendation to keep stands at or below 60 percent maximum SDI were used as a measure to maintain tree health and resistance to insect attack.

Differences between the alternatives were apparent immediately after thinning and at 10 and 20-year intervals. After commercial thinning, SDI levels for Alternative C were at or below recommended levels on 153 acres, as opposed to 460 acres in Alternative A. When including understory treatments during the 10-year period following harvest, 146 acres were still below the recommended density levels in Alternative C and about 100 acres in Alternative D. Alternative A maintained 517 acres at or below recommended levels. After 20 years, Alternative C maintained 129 acres at recommended levels, while Alternative D still maintained about 100 acres. Alternative A surpassed the other two action alternatives maintaining 380 acres at or below the recommended density levels after 20 years. For Alternative B, 86 acres were below the recommendation in 10 years and 73 acres in 20 years.

Based on this comparison, Alternative A would better meet stand density objectives, and thus have a lower risk for insect infestation for a longer period of time.

*Plantations and Reforestation*

The effects to plantations would be the same as Alternative B, the no action alternative. Proposed site preparation and reforestation would not occur, as in Alternative B.

*Aspen Restoration*

The effects of the proposed treatments would be the same as Alternative B.

*Hazard Tree Removal*

Hazard tree removal would have the same effects as Alternative B.

*Tractor Piling, Mastication, Hand Thinning, and Underburning:*

Where only fuels treatments are proposed in Alternative A, the indirect effects of understory treatments in Alternative D would be the same as those described under Alternative A. In areas where both overstory and understory treatments are proposed in Alternative A, the understory treatments proposed under Alternative D would improve tree health and resistance to insects, but generally to a lesser degree (see discussion on SDI above).

The indirect effects of proposed treatments on shrubs would be similar to Alternative A within all treated areas except where overstory treatments are proposed in Alternative A. In these areas, shrub growth may tend to be faster in Alternative A within stands having lower post-treatment canopy cover.

## Threatened, Endangered, Proposed, or Sensitive Plants and fungi:

There are no threatened or endangered plants known to occur on Tahoe National Forest System lands. The Tahoe National Forest does not contain critical habitat for threatened and/or endangered plants. No threatened, endangered or proposed plants have been found in the surveys of the Gold Project area.

**Sensitive plant species**: The project area contains an occurrence of the sensitive plant species, *Lewisia kelloggii* ssp. *hutchisonii.*

**Mitigation for *Lewisia kelloggii* ssp. *hutchisonii***: Buffer the occurrence by 100 feet to eliminate impacts from the proposed actions.

**Mitigation for all sensitive plant habitats**: The introduction of weeds (from implementation of the project) will be prevented by washing all equipment before it is used in the project area if it is coming from an area that has weeds, to prevent introduction of noxious/invasive exotic weeds. In addition, only weed free plant

materials will be used for erosion control (if needed) to prevent introduction of noxious/invasive exotic weeds.

## Overall

Tahoe National Forest Land and Resource Management Plan (Tahoe LMP) standards and guidelines and project specific mitigation measures have been designed to reduce any adverse impacts. Beneficial effects were not used in this analysis or supporting analyses to offset or compensate for adverse effects. No adverse effects of this project would be significant, even when considered separately from the beneficial effects that may occur in conjunction with those adverse effects.

**2. The degree to which the proposed action affects public health or safety.**

Prescribed fires produce smoke, which may have negative effects on sensitive people, generally the elderly and young children. There is some risk of fire behavior that exceeds prescription parameters and may be difficult to contain, but project design standards and management actions meet the safety requirements established for National Forest System lands.

Additionally, hazard trees would be removed along Forest Service system roads and within, or immediately adjacent to (tree felling distance), high-use recreational and administrative sites. The direct effects of removing hazard trees would be that roads would be safer for travel, and administrative or high use recreational sites would be safer for forest visitors, residents, and Forest Service employees.

The proposed actions would have no other effects to public health and safety.

**3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.**

***Historic/Cultural Resources***- The Gold Project area is near historic and/or prehistoric sites, but project actions have been designed to avoid cultural resource sites eligible for inclusion in the National Register of Historic Places, with the result that there would be no direct or indirect affects to any cultural resources eligible for inclusion in the National Register. Project actions would fully comply with the National Historic Preservation Act (NHPA), and implementing programmatic agreements (PAs).

***Parklands***- There are no parklands within the project area.

***Prime Farmlands***- There are no prime farmlands within the project area.

***Wetlands***- The project area contains riparian (wetland) plant communities associated with seeps, springs, and fens/peatlands that may be impacted by prescribed burning. Direct ignition of fuels would not occur within 100 feet of these plant communities. Significant impacts to these wetlands are not expected with implementation of the project's management requirements for protecting water quality, riparian areas, and aquatic resources. (Refer to Chapter II, Table 2.1. Management Requirements). Thinning and mastication would not impact these wetlands directly, indirectly, or cumulatively.

***Wild and Scenic Rivers***- The North Yuba River was recommended as suitable and eligible during the Wild and Scenic River EIS (May 1999) nomination process. It was determined eligible in one outstandingly remarkable value: Scenic. Project activities planned for the areas near the North Yuba River would not impact these outstandingly remarkable values directly, indirectly, or cumulatively, because none of the proposed actions would affect the scenic values.

***Ecologically Critical Areas***- There are no ecologically critical areas within the project area.

**4. The degree to which the effects on the human environment are likely to be highly controversial.**

The effects of this project on the quality of the human environment are not likely to be highly controversial. The project was subject to extensive analysis and planning, in addition to requiring the implementation of best management practices (BMPs), mitigation measures, and/or standard management requirements listed elsewhere in this document or in the project record. This has resulted in a limited and focused proposed action, which incorporates public concerns into the proposed action.

**5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.**

The proposed actions are routine tasks implemented on a regular basis by the Tahoe National Forest without incurring significant impacts. The results or effects of these actions on the human environment are predictable and known, based on similar past practices. The standard management requirements, mitigation measures, and/or best management practices included in this document and the project record would also reduce and minimize any impacts or risks that might have otherwise been uncertain, unique, or unknown.

**6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.**

The proposed actions or any of the alternatives would not establish a precedent for future actions, nor would it represent a decision in principle about a future consideration for other similar projects. Any future decision to treat the same or adjacent areas would be analyzed separately and on its own merits to determine a course of action. Future projects would require additional site-specific analysis and separate decisions as required under NEPA.

There are no future activities (maintenance) planned within this project. The concept of area treatments is not maintenance of a static pattern of treatment areas, but instead, the intent is to maintain a mosaic of both naturally-occurring and managed areas in which fuels have been modified so as to effectively interrupt the spread of a large wildfire.

While this project neither proposes, nor schedules, future actions in any of these areas this document does not eliminate the opportunity for future management actions.

**7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.**

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions and risks, while ignoring the important residual effects of past natural events, may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the

Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to informed decision-making. (40 CFR 1508.7)"
>
> For these reasons, the analysis of past actions in this section is based on current environmental conditions.

Design features included in the proposed action would avoid, minimize, or reverse adverse cumulative watershed effects and minimize impacts to rare plants, wildlife, aquatic species, and other sensitive resources to the extent that any residual effects would not be cumulatively significant. Biological Evaluations and a Watershed Effects Report that disclose cumulative effects, as well as direct and indirect effects, are in the project file and available from the District office.

**Evaluation of Cumulative Effects:**

A cumulative effect is the consequence on the environment that results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the actions occur.

***i) Cumulative effects on soil productivity.***

The direct and indirect effects of combined past, present, and proposed management activities can create a cumulative impact on soils. The cumulative impact on soils is best

analyzed in terms of the overall inherent productivity of the soils and is typically reflected in the growth and yield of trees on a site. Soil compaction caused by repeated entries using ground-based (tractor) equipment tends to accumulate within the watershed over time. Compaction decreases tree growth by restricting root growth and decreasing available soil moisture. Compaction also disrupts the continuity and volume of soil pore space. Soil pores are the major structural component of soil organism habitat. Soil organisms are responsible for developing critical properties that underlie basic soil fertility and productivity. These biological communities result from complex interactions and require anywhere from a few years to several hundred years to develop. Compaction or alteration of the surface soil layers can have detrimental effects on soil organism populations. No quick remedies are available if extensive damage to the soil system occurs.

The cumulative effects assessment area for the soils resource is spatially bounded by the proposed activity areas, because this is where the full extent of soil disturbing activities would take place. The cumulative effects analysis is bounded in time the extent to which the soil resource would be expected to recover from potential impacts. For soil cover impacts, the temporal scale for effects would be relatively short (5 to 10 years) because inputs to soil cover are readily available from the vegetation remaining in and around the treatment units and because the treatments would leave sufficient soil cover, as previously described under direct and indirect impacts on soil productivity. The temporal scale for assessing cumulative effects on soils from compaction and soil organic matter would be longer (decades) because these effects linger; hence, recovery is longer.

The cumulative watershed effects disturbance mapping does not show any recent (less than 20 years old) activity within the proposed tractor thinning activity areas. Some of the underburning activity areas have had past management as evidenced by windrows.

Although management requirements detailed in Chapter II, Table 2.1 for all the action alternatives (Alternatives A, C, and D) would minimize potential adverse effects on soil productivity, some new detrimental compaction would occur within the proposed activity areas. Monitoring on the Plumas National Forest has shown that an average of 8 to 10 percent new compaction is added with each reentry with ground based equipment into an activity area. However, given that existing detrimental compaction in the activity areas with a previous management history is generally less than 5 percent, overall direct effects should be within the Forest Plan standards for porosity. A small net beneficial effect would occur where old skid trails and landings were reused and then subsoiled. Monitoring on the Tahoe National Forest and other national forests in California has shown that the management requirements designed to minimize adverse effects on soils would limit adverse effects of the proposed project activities on soil porosity.

None of the action alternatives (Alternatives A, C, and D) would result in significant adverse direct or indirect soil impacts. With minor residual compaction resulting from past actions within the activity areas and no other present actions occurring and no reasonably foreseeable future actions planned within these areas, Alternatives A, C, or D,

in combination with the effects of past, present, and reasonably foreseeable future actions, would not produce adverse cumulative effects on soils.

While implementation of the No Action alternative (Alternative B) would not result in any direct or indirect project-related effects on soils, organic matter in terms of surface and ladder fuels would continue to increase over time, with a corresponding increase in fire hazard. If a high intensity wildfire were to occur, the potential for soil organic matter destruction, nitrogen volatilization, microbial mortality, structure and porosity destruction, and inducement of water-repellency would be greatly elevated. This could severely damage soils and cause long-term declines in soil productivity and hydrologic function. In extreme cases, soils could not be revegetated without management intervention.

***ii) Cumulative watershed effects***.

Ground-disturbing activities can cause both direct and indirect watershed effects that persist through time. The cumulative result of all these effects is the potential to adversely affect downstream beneficial uses of the water. Cumulative watershed effects (CWE) analysis may reveal that, while the proposed activities themselves may not be sufficient to substantially impact the watershed, when analyzed in connection with past, present, and future activities, they may become a cause for concern.

**Methodology**

A complete discussion of the CWE analysis can be found in Appendix C of this document. A summary of the CWE analysis follows. Forest Service and private timber sales plus all private lands with Timber Harvest Plans filed for future sales were included in the CWE analysis. All activities proposed by the Tahoe National Forest in the Gold Thinning Project Scoping Letter were included in this CWE.

Cumulative watershed effects are the combined effects of past, present, and future land management activities within a watershed that may affect the watershed's hydrologic structure or process. The Forest Service's Pacific Southwest Region uses a standardized analysis process to assess the potential risk of cumulative watershed effects resulting from management activities (FSH 2509.22). This cumulative watershed effects analysis compares (a) the existing level of land disturbance within a watershed with (b) an estimate of the upper limit of watershed tolerance to disturbance, referred to as the Threshold of Concern (TOC). The level of land disturbance is measured using Equivalent Roaded Acres (ERAs), whereby all disturbances are equated to an acre of road. The cumulative watershed effects analysis then recovers these disturbances over some period of time following a specified recovery curve. The existing ERA of a watershed is compared to the TOC to provide an assessment of the potential for cumulative watershed effects.

One measure of cumulative watershed effects in based on the relationship between equivalent roaded acres (ERA) and watershed threshold of concern (TOC). The

ERA/TOC model provides a simplified accounting system for tracking disturbances that affect watershed processes, in particular, estimates in peak runoff flows influenced by ground-disturbing activities. Unlike the surface erosion model (USLE), ERA/TOC is not intended to be a process-based sediment model. It does, however, provide an indicator of watershed conditions.

Two critical parts of the CWE analysis process include: (1) determining the Threshold of Concern (TOC) for each affected watershed and (2) assigning Equivalent Roaded Acre (ERA) coefficients and recovery curves to different types of natural resource management activities.

**Thresholds of Concern:** The Tahoe National Forest has developed a standard method for determining watershed TOC values based on several factors. Each watershed is assessed for its ability to withstand erosional processes and handle sediment delivery to stream channels. The assessment is based on climatological, geologic and soils information, on-the-ground surveys of the stream channels and upland areas; and the experience and knowledge of current and previous TNF hydrologists. A range of TOC values, from a high of 0.18 (18%) to a low of 0.09 (9%), have been established for each 7$^{th}$ field Hydrologic Unit Code (HUC) watershed on the Forest, using the watershed assessments, soil porosity guidelines in the Forest Plan, and literature review of research on impacts of timber harvesting activities on sediment production.

**Coefficients and Recovery Curves:** ERA coefficients assigned to the Gold Project's activities include the following: 0.40 for hand cutting vegetation with tractor piling and burning piles; 0.20 for the ground-based (tractor) thinning; 0.10 for helicopter aspen restoration, mechanical mastication, skyline thinning, and underburning; and 0.05 for hand cutting vegetation with hand piling and burning piles. The use of a skyline yarding system was analyzed for slopes generally greater than 25 percent, outside of the aspen restoration areas. The aspen restoration areas would use a helicopter yarding system due to their locations near meadows and riparian areas. Helicopter yarding could be conducted on other steeper areas analyzed as skyline. However, the cumulative watershed effects of helicopter yarding within the skyline yarding units would be lower than those analyzed here because there is less ground disturbance associated with helicopter yarding. Coefficients have been developed based on soil monitoring results, literature reviews, and consultation with other hydrologists. A 30-year straight line recovery rate is used for this analysis.

Ground-disturbing activities can cause both direct and indirect watershed effects that persist through time. The cumulative result of all these effects is the potential to adversely affect downstream beneficial uses of water. Cumulative watershed effects analysis may reveal that even though the proposed action alone may not be sufficient to substantially impact the watershed, when analyzed in connection with other past, present, and future activities, the effects of the proposed action may become cause for concern. Past and present Forest Service vegetation and fuels management projects and timber harvests on private lands were included in the cumulative watershed effects analysis. The

recently filed Shaughnessy Timber Harvest Plan (08-028-Sie) and the Black Jack Timber Harvest Plan (08-081-Sie) are included in this analysis.

The spatial cumulative effects boundary considered in this analysis is the four HUC7 watersheds listed in Table 1 below. This spatial boundary was selected because it includes all of the watersheds affected by the Gold Project, thereby ensuring the analysis captures potential adverse effects of not only the Gold Project but other activities within the affected watersheds that could potentially affect watershed conditions. The temporal boundary is approximately thirty years for past projects (based on the assumed recovery period for land disturbing activities) and any known, foreseeable projects that have enough detail to reasonably analyze in the CWE analysis. The Gold Watershed Disturbance Map and supporting tables are a part of the project record.

**Cumulative Effects of Alternatives A, C, and D**

Ground-disturbing activities can cause both direct and indirect watershed effects that persist through time. However, by restricting ground-based equipment to slopes generally less than 25 percent and utilizing aerial systems in the remaining area, compaction and disturbance of soils in the project area would be minimized. These actions would also reduce the risk of erosion and sediment movement. The RCAs in the project area and activities within RCAs are consistent with the Sierra Nevada Forest Plan Amendment (2004) and have been set to protect and restore aquatic, riparian, and meadow ecosystems. Implementing any of the action alternatives, with the specified management requirements, would result in a low risk of negative cumulative watershed effects.

This project is designed to protect watershed values by reducing potential direct and indirect effects associated project activities, such as erosion and sedimentation and protecting sensitive lands while meeting other resource objectives. By reducing the direct and indirect effects, cumulative effects would also be reduced under Alternatives A, C, and D.

The Threshold of Concern (TOC) and Equivalent Roaded Acres (ERA) by drainages are displayed in the table below. Alternative A, shows effects of the proposed action on the CWEs for the Gold project.

**Table 3-6. Cumulative Watershed Effects Analysis Percent ERA by Alternative**

| | | | ALT. A | ALT. B | ALT. C | ALT. D |
|---|---|---|---|---|---|---|
| | | | Proposed Action | Existing Condition | 2001 SNFPA | Noncom. Funding |
| **Drainage Name** | **Acres** | **% TOC** | **% ERA** | **% ERA** | **% ERA** | **% ERA** |
| Lower Pauley Creek | 5,743 | 13% | 6.1% | 1.7% | 5.8% | 4.8% |

| | | | | | | |
|---|---|---|---|---|---|---|
| Middle Pauley Creek | 5,416 | 13% | 3.0% | 1.8% | 2.8% | 2.5% |
| North Yuba River- Ladies Canyon | 7,194 | 13% | 3.9% | 2.5% | 3.9% | 3.6% |
| North Yuba River- New York Ravine | 6,378 | 13% | 3.5% | 2.8% | 3.5% | 3.4% |

**Table 3-7. Cumulative Watershed Effects Analysis ERA/TOC Ratio by Alternative**

| | | | ALT. A | ALT. B | ALT. C | ALT. D |
|---|---|---|---|---|---|---|
| | | | Proposed Action | Existing Condition | 2001 SNFPA | Noncom. Funding |
| **Drainage Name** | **Acres** | **% TOC** | **ERA/TOC** | **ERA/TOC** | **ERA/TOC** | **ERA/TOC** |
| Lower Pauley Creek | 5,743 | 13% | 0.47 | 0.13 | 0.45 | 0.37 |
| Middle Pauley Creek | 5,416 | 13% | 0.23 | 0.14 | 0.22 | 0.19 |
| North Yuba River- Ladies Canyon | 7,194 | 13% | 0.30 | 0.19 | 0.30 | 0.28 |
| North Yuba River- New York Ravine | 6,378 | 13% | 0.27 | 0.22 | 0.27 | 0.26 |

Proposed Action risk to cumulative watershed effects:
Low risk Drainages include: Lower Pauley Creek, Middle Pauley Creek, North Yuba River-Ladies Canyon, and North Yuba River-New York Ravine.

Moderate risk Drainages include: None.

High risk Drainages include: None.

Very High risk Drainages include: None

Low Risk = (%ERA/TOC less than 0.50)
Moderate Risk = (%ERA/TOC = 0.50 - 0.79)
High Risk = (%ERA/TOC = 0.80 - 0.99)
Very High Risk = (%ERA/TOC = 1.00 or greater)

Table 3-7 shows the ERA/TOC ratio before the Gold project and the changes in the ERA/TOC ratios occurring under each alternative. Before the project, all HUC7 drainages are below 50 percent of TOC and therefore have a low risk of negative cumulative watershed effects. The Gold Project's action alternatives increase the ERA/TOC ratios in all of the HUC 7 drainages but none increase above the 50 percent ERA/TOC ratio. None of the drainages are expected to exhibit negative cumulative watershed effects due to the management activities that are a part of the project proposal (Alternative A) or Alternatives C or D. The management requirements and the State mandated BMPs have been successfully used on many projects both on the Tahoe National Forest and other forests in California to protect water quality.

The RCAs in all drainages have been set to reduce the risk of sediment delivery to streams. Implementing the proposed action, with the specified management requirements, would result in a low risk of negative cumulative watershed effects.

**Cumulative Effects of Alternative B (No Action)**

Under Alternative B, existing conditions in the four HUC7 drainages would continue to proceed through natural processes. Natural processes include: hill slope erosion and stream channel sedimentation, recruitment of coarse large woody debris (CWD), and balancing stream flow, stream gradient and stream substrate composition. Alternative B would have both positive and negative impacts on watershed conditions. A positive outcome of the No Action Alternative is that no short-term ground disturbance would occur, thus reducing the potential for increased sediment transport to streams, loss of soil cover, or degradation of riparian or aquatic habitats associated with land management activities.

The No Action Alternative would also preclude opportunities that may benefit watershed resources, such as, thinning overstocked stands of trees, restoring aspen stands, reducing fuels accumulations by underburning and mastication, and improving portions of the road system that are currently delivering sediment to the stream system.

The cumulative effect within the project area of lands impacted by past management activities and the soil compaction effect of roads, landings, and skid trails would continue to recover over time. Alternative B (No Action Alternative) represents the existing condition in the drainages including activities on private land. No drainages exceed the TOC for the existing condition.

**iii) *Cumulative effects on wildlife, aquatic species, and threatened, endangered, or sensitive plant species*.**

***Wildlife/Aquatics***: Cumulative effects to wildlife consider the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects to fish, wildlife, and rare plants are discussed in detail in the following project documents, which are incorporated by reference: (1) Biological Evaluation for Birds, Mammals, Amphibians, Reptiles, Fish, and Invertebrates, (2)

Biological Evaluation for Plants and Fungi, and (3) Management Indicator Species Report. These documents are located in the project file and are available upon request from the Yuba River Ranger District office. The analyses in these documents consider past, present and reasonably foreseeable effects within the analysis area. In general, the cumulative effects analysis area for wildlife includes the sixth-field watersheds that encompass the project area. When needed, the analysis area may expand beyond this area, to include the home ranges of wide-ranging animals such as forest carnivores, raptors, and deer that may use the analysis area as a regular part of their home range, or for movement, migration and dispersal.

The temporal period selected for changes in vegetation from logging include a time period since 1992, which includes the best available data layers to complete this analysis in GIS. A qualitative assessment comparing the layers used against additional information (disturbance layers, aerial photos, vegetation maps from the 1980s), did not show meaningful changes that would warrant a different time frame.

In addition to the Gold Project, the following factors may affect wildlife:

*Disturbance related to Fire*—There are no stand-replacing fires recorded within the project area or its surrounding sixth-field watershed.

*Disturbance Related to Human Presence*—There is no residentially developed private land within the project area or its surrounding sixth-field watersheds. Private land parcels are primarily used for production of Christmas trees. Heavily used trails traversing the project area include the Pacific Crest Trail to the east, which receives heavy non-motorized use in the summer, and the Butcher Ranch Trail, which receives both motorized and non-motorized use, especially mountain biking.

*Disturbances Related to Road Density*— Existing road densities range from 0.5 to 6 miles of road per square mile. This project proposes to decommission approximately 5.1 miles of roads that are spread out across the analysis area, which would reduce cumulative adverse effects to wildlife.

*Timber harvest on Public and Private Lands*— This project area lies north of an Area of Concern identified in the Tahoe National Forest for maintaining spotted owl habitat that was identified by Vernet et al. (1992). The Area of Concern was identified because of the interface between natural habitat fragmentation of closed-canopy forests that occurs in higher elevations, and the checkerboard patterns of private and public land ownership.

Private land comprises approximately 26% (4,256 acres) of this analysis area. Logging in the past 20 years has occurred on approximately half of these lands, but only 48 acres of late-successional habitat (CWHR 5M) has been removed under Timber Harvest Plans. Logging on National Forest System land has not removed late-successional habitat since 1992. Within the analysis area for potentially affected California spotted owls, timber harvest on private land has removed less than 1% of available habitat in the analysis area since 1992.

The wildlife Biological Evaluation discusses the potential direct, indirect, and cumulative effects to late successional habitat and federally protected and sensitive species in detail. It concludes that Alternative A may add cumulative effects to sensitive wildlife species associated with late-successional habitats, but the degree of these effects are small because: (1) Overall habitat quality and quantity are maintained within the analysis area, and (2) No habitat characteristics are removed to a degree where effects would be expected to limit populations. The cumulative effects of Alternatives C and D on habitats for sensitive wildlife species associated with late-successional conditions would be less than under Alternative A, because fewer acres are treated.

There are no direct or indirect effects to any federally endangered, threatened, or proposed wildlife species, so there are no cumulative effects from this project. As disclosed in the Gold Project Biological Evaluation, none of the action alternatives would lead to a trend toward listing for any Region 5 Forest Service Sensitive species—California spotted owl, northern goshawk, great gray owl, willow flycatcher, Pacific fisher, American marten, Sierra Nevada red fox, California wolverine, pallid bat, or the Townsend's big-eared bat. As disclosed in the Gold Project MIS Report, none of the action alternatives would alter existing forest-wide trends of the selected MIS species—fox sparrow, mountain quail, California spotted owl, American marten, northern flying squirrel, and hairy woodpecker.

***Threatened, Endangered, or Proposed Plants***: There are no threatened or endangered plants known to occur on Tahoe National Forest System lands. The Tahoe National Forest does not contain critical habitat for threatened and/or endangered plants. No threatened, endangered or proposed plants have been found in the surveys of the Gold Project area.

***Sensitive Plants and fungi***: The project area contains an occurrence of the sensitive plant species, *Lewisia kelloggii* ssp. *hutchisonii*. Mitigations would be implemented to avoid any effects to this sensitive plant occurrence. No other present or reasonably foreseeable future actions would directly or indirectly affect this known occurrence; hence, no adverse cumulative effects are expected.

**iv) *Cumulative effects on forest vegetation.***

The cumulative effects analysis for vegetation includes the land area encompassing Alternative A's treatment units. The area of cumulative effects was bounded in this manner because unlike wildlife or water resources, vegetation is stationary and the full extent of vegetation modification would take place within the treatment units. Twenty years was chosen as the cumulative effects timeframe based on the timeframe specified in the letter from the Regional Forester entitled "Conifer Forest Density Management for Multiple Objectives" dated July 14, 2004 (in project file). A threshold level of 60 percent of a maximum stand density index (SDI) was chosen based on recommendations by Jim Long (Smith and Long 2003). The desired condition for vegetation is based on Forest Plan (SNFPA ROD 2004) desired conditions for land allocations and the desired conditions stated in the Gold Project Scoping Letter. Baseline levels were determined from existing condition and historic accounts (Leiberg 1902).

There are no other known vegetation- related projects currently being planned or implemented within the proposed treatment units (or on Forest Service System lands within the Gold Project area). Sierra Pacific Industries is planning a project called the Shaughnessy THP on 286 acres within the project area located in T20N, R10E, Section 25; T20N, R11E, Sections 19, 21, 29 and 31, but these areas lie outside the proposed treatment units. Hence, cumulative effects of the action alternatives (Alternatives A, C, and D) consist of their direct and indirect effects on vegetation, as described below.

**Alternative A**

*Thinning* - While commercial thinning affects primarily ladder and crown fuels, both surface and ladder fuels would be reduced through the understory treatments. Additionally, canopy base height would increase where surface and ladder fuels are treated. In units where only shrubs and small trees are removed, decreased competition in the residual stand would encourage the growth of larger, more flame-resistant trees. Treatments would also address the immediate fuels hazard in these stands.

In proposed thinning stands, tree health and vigor would improve resulting in an increased resistance to insects and disease, improved growth, less density related mortality, and a more diverse stand structure. On about 460 of the proposed thinning acres, after treatment stand densities would be reduced to a level that would maintain vigor and avoid competition induced mortality (Smith and Long 2003). The remaining area would also have healthier more vigorous trees and a more diverse structure even though stand densities would remain higher than that considered desirable for maintaining tree health and vigor. After 20 years, approximately 40 percent of the proposed thinning acres would remain at a level that would maintain vigor and avoid competition induced mortality. Because the remaining 60 percent of the acres proposed for thinning in Alternative A would have higher SDIs than the threshold where vigor is maintained and self thinning is prevented, evaluation for re-entry in 20 years is recommended (see table in Appendix D).

*Canopy Cover* - Canopy cover would meet or exceed 40 percent in all natural stands after thinning. Canopy cover would be reduced to below 50 percent in some stands to minimize the need for re-entry. Except within openings, shrub growth should be minimal and short term in stands that maintain these levels of canopy cover. New shrub growth from stored seed would germinate in skid trails, gaps, and in areas that are underburned. Where thinning without understory treatment is prescribed, increases in shrub growth would generally be minimal and short term as tree crowns would quickly fill openings in the canopy. Around black oak and large conifers (> 29" dbh) and where small (1/4 acre) canopy gaps are created through thinning, more shrub growth would be expected, especially in mechanically treated and burned areas. The increased sunlight and decreased vegetative competition for water and soil nutrients in the openings created around large conifers and oaks would help them to become healthier and more vigorous and thus persist longer than without this treatment.

*Structural Diversity* - Development of complex canopies (vertical diversity) involves the establishment and growth of shade-tolerant tree species into the middle and upper canopy levels (Franklin 2001). Developing complex spatial patterning or structural patches within mature and early old-growth stands (horizontal heterogeneity) is largely the result of patchy or spatially aggregated mortality caused by diseases, insects, and wind (Franklin 2001). Alternative A allows flexibility to create the patchiness seen in natural old-growth stands. Prescriptions developed for Alternative A concentrate on improving structural diversity through creating small canopy gaps, preserving the natural clumpy structure within stands, and in some stands, creating a more uneven-aged stand structure (see SDI-Flex spreadsheets and diagram in marking guidelines, in Appendix D).

*Canopy Gaps* - In Alternative A, openings created through timber harvesting would generally not exceed ¼ acre in size. Even though natural regeneration would occur within these openings, the purpose for creating openings is not to regenerate conifers. The purpose of these openings is to increase structural diversity. Additionally, the gaps would not be of sufficient size to regenerate pine species. Kevin O'Hara (2005) found that in mixed species forests – that often have greater crown closure and higher LAI (Leaf Area Index) – group (opening) sizes must be sufficiently large to provide conditions where ponderosa pine has an advantage. York and others (2004) documented the edge effect for six conifer species in the Sierra Nevada where the greatest growth was from seedlings in the center and north of center within group openings. For ponderosa pine, mean height of seedlings after five years was greatest in the largest opening sampled (1 ha).

After harvesting, gaps would be left "as is", hand piled and burned within the gaps, or the remaining fuels would be piled and burned outside of the gaps. Burning within gaps would stimulate stored seed to germinate resulting in *Ceanothus* regenerating in many of the gaps. Ceanothus is an important source of available nitrogen (Erickson et al. 2005, Oakley et al 2003) that persists even after the shrubs have been removed by fire (Oakley et al. 2003). North et al. (2009) recommends that in forests where shrubs are currently rare, it is important for managers to consider protecting what shrubs remain and increasing understory light conditions for shrub establishment and patch expansion. Within gaps, conifers would regenerate from natural seed fall from primarily shade tolerant fir.

*Plantations* - The cumulative effects of plantation thinning would be increased tree health and growth, less density related mortality, enhanced wildlife habitat through development of older forest characteristics, improved oak growth and longevity, and more fire resilient forested stands.

*Conifer Regeneration* - The cumulative effects of site prep and planting would be an increased percentage of the project area in a forested condition, with the growth of large diameter conifers in a shorter period of time than had no treatment occurred. Additionally, the forested stands would be more resilient to changes in climatic condition because of increased species diversity over what would occur naturally.

*Aspen Stands* - The cumulative effects of removing conifer competition within and around aspen stands is that aspen stands would be healthy with sufficient regeneration to persist on the landscape, providing habitat for wildlife and increasing species diversity in forested stands.

*Shrubs* - In areas where the understory would be masticated or underburned along with thinning, growth of resprouting vegetation would be more aggressive than in areas only thinned. Where tractor piling is proposed within thinning units, shrub response is expected to be minimal. Proposed canopy cover retention would suppress the growth of sprouts considerably in natural stands when compared to treatment areas without these levels of canopy cover. Herbicide use, other than a fungicide (Sporax) used on stumps to control root disease, is not planned or anticipated for this area at this time.

*Hazard Tree Removal* - Hazard tree removal would remove potential hazards to forest visitors, residents, and Forest Service employees. In accordance with District hazard tree guidelines, hazard trees would be removed along maintenance level 3, 4, and 5 Forest Service system roads within the thinning units only. Other hazardous trees as defined under OSHA would be removed during thinning operations as required by law.

*Past, Present and Foreseeable Future Projects* - In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

There are no known irreversible or irretrievable effects to vegetation if this project is implemented.

**Alternative B**

The cumulative effects of Alternative B would be that current trends would continue. Thinning, mastication, hand cutting, tractor piling, and underburning would not improve tree health in overcrowded stands, reduce wildfire risk, or improve structural diversity (at least initially). In the absence of disturbance, black oak would continue to decline because of lack of sunlight. Structural diversity would slowly improve over time as large trees die and create gaps for regeneration. Increased mortality in large trees would result in an increased number of large snags available for wildlife habitat. Because of the limited amount of sunlight reaching the forest floor in tree fall gaps, most regeneration would be shade tolerant species such as true fir. True fir is less able to tolerate drought or fire than the less shade tolerant pine or Douglas-fir. In 10 years, without a major disturbance, 91 percent (854 acres) of the proposed thinning acres (see table in Appendix D) would exceed density levels where stands maintain vigor and avoid density related mortality. In 20 years, 92 percent (867 acres) of the area would exceed recommended stand density levels. Tree mortality in overcrowded stands would lead to increased

surface fuel loadings as stand densities continue to increase over the next 20 years (see table in Appendix D).

*Canopy Cover* - While canopy cover would increase in some areas and decrease in others, generally there would be a slight increase overall (about 40% of the acres proposed for thinning) in canopy cover over the next 20 years (see table in Appendix D) in the absence of wildfire or other widespread natural disturbance.

*Structural Diversity* - Over time, mortality would occur in small patches creating increased horizontal diversity. As previously mentioned, gaps would fill in with mostly shade-tolerant tree species such as true fir. Smaller shade tolerant trees would continue to grow up into the canopies of larger trees creating increased vertical diversity. While structural diversity would improve, conditions would become ideal for crown fire initiation.

*Plantations* - Tree health would decrease in overcrowded plantations making them more susceptible to insects and disease. Additionally, as tree canopies close, shrubs would eventually succumb to competition for site resources. Consequently, dead trees and shrubs would add to future surface fuel loadings.

*Conifer Regeneration* - Over time, naturally regenerating true fir seedlings would eventually regenerate understocked areas, overtopping and shading out the brush as tree canopies begin to close.

*Aspen Stands* - Aspen health and growth would continue to decline. Without wildfire or insect infestation, conifers would eventually out-compete the aspen.

*Hazard Tree Removal* - Hazard trees along system roads within thinning units would continue to pose risks to vehicles and recreationists.

There are no known irreversible effects to vegetation if Alternative B is implemented. Alternative B would have an irretrievable loss in tree health, resulting in a loss in growth and vigor (when compared to Alternative A) in overcrowded stands.

**Alternative C**

*Thinning* - Similar to Alternative A, proposed thinning and understory treatments would reduce canopy bulk densities in all thinning units and increase canopy base height in units where understory treatments are proposed. In areas with primarily shrubs and small trees, decreased competition in the residual stand would encourage the growth of larger, more flame-resistant trees. Treatments would also address the immediate fuels hazard in these areas.

In Alternative C, tree health and vigor would improve (but not as much as in Alternative A), resulting in an increased resistance to insects and disease, improved growth rates, and less density related mortality then if no treatments were to occur. FVS runs demonstrate

that approximately 153 acres proposed for thinning in Alternative C would have post treatment stand densities reduced to a level (less than or equal to 60% maximum SDI) that would maintain vigor and avoid competition induced mortality (Smith and Long 2003 and Long 2004), thus meeting the Regional Forester's recommendation for density management. Additionally, in approximately 129 acres of the proposed thinning units, density would remain at a level that would maintain vigor and avoid competition induced mortality for at least 20 years. Alternative A would achieve desired SDI levels over about 460 of the acres and maintain these levels on about 380 acres for 20 years. As previously mentioned, Alternative B would meet recommended density levels on about 73 acres after 20 years. Based on this analysis, Alternative A would best meet the Regional Forester's recommendations for density management. Since the effectiveness of the treatments in both action alternatives diminishes after 20 years, evaluation for re-entry is recommended again 20 years after treatment.

*Canopy Cover:* After harvest operations, canopy cover would meet or exceed 50 percent in all proposed thinning units. Shrub growth would be minimal and short-term in stands that maintain these levels of canopy cover. New shrub growth from stored seed would germinate in skid trails and in areas that are underburned. Where thinning without understory treatment is prescribed, increases in shrub growth would generally be minimal and short-term as tree crowns would quickly fill openings in the canopy. Around black oaks and large conifers (greater than 29" dbh) and in the small ¼ acre gaps, more shrub growth would be expected. Openings around oaks and large conifers would provide increased sunlight and decreased vegetative competition for water and soil nutrients, helping trees to become healthier and more vigorous and thus persist longer than without this treatment. Treatment around black oaks and large (greater than 29" dbh) conifers would not be as effective as in Alternative A because of diameter restrictions in most units and to a lesser degree, higher canopy cover restrictions.

*Structural Diversity* - Because of the 20-inch maximum diameter limit (and in some areas 11 inches), Alternative C does not offer as much flexibility to improve structural diversity as Alternative A. In fact, prescriptions for thinning from below often encourage the development of single storied even-sized stands. According to Jerry Franklin (2001), "Developing old-growth attributes is not just about creating stands with uniformly-spaced, large diameter trees. Rather, it involves creating a multiplicity of individual structures and heterogeneous spatial patterns of those structures. Creating large trees is important but so is establishment and growth of shade tolerant species and creation of decadence in its many forms." Alternative C prescriptions would still attempt to promote clumpiness in structure to the extent possible, while also striving to reduce stand density to levels that promote tree health and insect resistance. However, Alternative C would not meet structural diversity objectives as well as Alternative A.

*Plantations and Reforestation* - The effects of the proposed treatments would be the same as in Alternative A.

*Aspen* - The effects of the proposed treatments would be the same as in Alternative A.

*Hazard Tree Removal* - Hazard tree removal would have the same effects as in Alternative A.

*Shrubs* - Understory treatments such as tractor piling, mastication, hand thinning, and underburning in Alternative C would be the same as in Alternative A. Thus, the overall effectiveness of understory treatments should not change from Alternative A. As in Alternative A, herbicides use is not planned or anticipated for this area at this time.

The effects of hazard tree removal would be the same as in Alternative A.

There are no known irreversible or irretrievable effects to vegetation if this project is implemented.

**Alternative D**

*Understory Thinning*

Proposed understory treatments would reduce ladder fuels and increase canopy base height. In areas with primarily shrubs and small trees, decreased competition in the residual stand would encourage the growth of larger, more flame-resistant trees. Treatments would also address the immediate fuels hazard in these areas.

In Alternative D, tree health and vigor would improve (but not as much as Alternatives A and C), resulting in an increased resistance to insects and disease, improved growth rates, and less density related mortality then if no treatments were to occur. FVS runs demonstrate that approximately 215 acres proposed for thinning in Alternative D would have post treatment stand densities reduced to a level (less than or equal to 60% maximum SDI) that would maintain vigor and avoid competition induced mortality (Smith and Long 2003 and Long 2004), thus meeting the Regional Forester's recommendation for density management. Additionally, in approximately 100 acres of the proposed understory thinning units, density would remain at a level that would maintain vigor and avoid competition-induced mortality for at least 20 years.

Approximately 460 acres proposed for thinning in Alternative A would have post treatment stand densities reduced to a level (less than or equal to 60% maximum SDI) that would maintain vigor and avoid competition induced mortality (Smith and Long 2003 and Long 2004), thus meeting the Regional Forester's recommendation for density management. Additionally, in approximately 380 acres of the proposed thinning units, density would remain at a level that would maintain vigor and avoid competition-induced mortality for at least 20 years. Alternative C would achieve desired SDI levels over about 153 of the acres and maintain these levels on about 129 acres for 20 years. Alternative D would maintain stand densities at the recommended levels on about 100 acres for 20 years. As a comparison, no treatment (Alternative B) would meet recommended density levels on about 73 acres after 20 years. Based on this analysis, Alternative A would best meet the Regional Forester's recommendations for density management. Since the effectiveness of the treatments in all action alternatives

diminishes after 20 years, evaluation for re-entry is recommended again 20 years after treatment.

*Canopy Cover:* After harvest operations, canopy cover would meet or exceed 40 percent in all understory thinning units that overlap with commercial thinning units in Alternative A. Shrub growth would be minimal and short-term in stands that maintain these levels of canopy cover. New shrub growth from stored seed would germinate in skid trails and in areas that are underburned.

*Structural Diversity*

Because of the 10-inch maximum diameter limit, Alternative D does little to improve structural diversity. Alternative D would not meet structural diversity objectives as well as Alternative A or C. Alternative D would improve structural diversity more than Alternative B, however.

*Plantations and Reforestation*

The effects to plantations would be the same as Alternative B, the no action alternative. Proposed site preparation and reforestation would not occur as in Alternative B.

*Aspen*

The effects of the proposed treatments would be the same as Alternative B.

*Hazard Tree Removal*

Hazard tree removal would have the same effects as Alternative B.

*Shrubs*

Effects to shrubs from understory treatments in Alternative D would be the same as in Alternative A. Thus, the overall effectiveness of understory treatments should not change from Alternative A. However, where proposed commercial thinning overlaps with understory treatment in Alternative A, shrub growth in Alternative D may be slower because of higher residual canopy cover. As in Alternative A, herbicide use is not planned or anticipated for this area at this time.

There are no known irreversible effects to vegetation if this project is implemented. Some areas proposed for thinning in Alternative A, but not treated in Alternative D would have an irretrievable loss in tree health, resulting in a loss in growth and vigor in overcrowded stands.

**v) *Cumulative effects on Wildland Fuels and Fire Behavior.***

It is the combined effects of the prescribed fuel treatments that have the greatest benefit in changing fire behavior. The combination of raising the crown base height in thinning units through harvest and surface fuel reduction, and stand thinning and piling, or mastication to reduce surface fuels and crown bulk density within the fuels treatment units create a dynamic change in fire behavior, specifically crown fire potential. The strategic location of units along ridgelines and adjacent past fuels treatments increases the overall effectiveness of treatments.

Stand-level treatments would reduce potential fire behavior, fire related tree mortality, and spotting in treatment units. These treatments would increase the ability of fire management personnel to suppress and contain wildfires during initial and extended operations while increasing firefighter and public safety. At the landscape level, these treatments would provide connectivity between existing fuel treatments and break up the continuity of surface and crown fuels. A reduction of landscape-level fire related tree mortality would help maintain stand structure in HRCAs, PACs, and HRCAs in the project area.

Modifying forest structure and treating surface fuels would create fire resilient stands (Pollet and Omi 2002, Graham et al. 2004) and restore the ecological characteristics associated with high frequency, low to moderate severity fire regimes (Kilgore 1973, Martin 1991).

When the above listed fire behavior descriptors (Flame Length, Rates of Spread, Fireline Intensity, and Crown Fire Behavior) are taken in combination, the resulting fire behavior in the area after treatment provides for safer and more effective firefighting. Additionally, the resource damage potential of a wildland fire within the treatment units is greatly reduced.

There are no other past, present, or reasonably foreseeable future actions that could add to the cumulative effects on wildland fuels or fire behavior.

Under the No Action Alternative, stands in the area would not be fire resilient and the ecological characteristics of high frequency; low to moderate severity fire regimes would not be restored. This area of the Tahoe National Forest has a history of large, stand replacing wildfires that have occurred including the Tunnel No. 6 Fire in the 1965 and the Bassetts Fire in 2006. The effects of these fires include loss of structures, critical habitat for threatened and endangered species, timber, plantations and damage to soils, watershed and recreational values. The financial costs of suppression, emergency rehabilitation and restoration of these fires have been high. There is an indirect impact from the loss and/or damage to property and natural resources and the associated financial costs mitigating these negative effects under this alternative.

### *vi) Cumulative Effects on Air Quality:*

The information presented in this section is summarized from the Fuels Report and the Air Quality Analysis prepared for the Gold Project (January 2010), which are hereby incorporated by reference. The complete Fuels Report and Air Quality Analysis are available in the Gold Project Record.

The Gold Project is located in a rural mountainous area with a very low population density. Air quality is good throughout the year. The primary human activities that might affect air quality are thinning related activities that used prescribed fire and other construction activities that produce dust. Since the project area is large, and the expected activities would be widely dispersed over space and time, activity generated dust and smoke are expected to remain at levels that meet both state and federal air quality standards for this area.

Due to the location of the Gold Project area, the nature of prevailing winds, and the amount and timing of occurrences of dust and smoke, the communities of Downieville or Sierra City are not expected to experience any adverse air quality effects from actions proposed. Any adverse effects from prescribed burning would be minimized by the implementation of air quality regulation requirements and the standard mitigation measures applied to prescribed fire on the Yuba River Ranger District and the adjacent National Forest, public, and private lands.

Since all of the action alternatives would follow the Smoke Management Guidelines for Agricultural and Prescribed Burning contained in Title 17 of the California Code of Regulations it is expected that the current high level of air quality in the Gold Project Area and the Yuba River Ranger District would be maintained. Overall smoke emissions from prescribed fire on the Yuba River Ranger District are expected to remain within a range similar to the current level. The actual amount of emissions would vary from year to year based on the weather and fuel conditions and on the requirements for smoke management that result from coordination with the CARB within the Nevada Sierra County Air Quality Management District.

Under the No-Action Alternative, the project area would be subjected to long-term deposition of surface fuels. Forest fuels would continue to increase with biomass production and would out-produce the decomposition rates in this climate. The long-term chronic effects would be higher uncontrolled $PM_{10}$ emissions during a wildfire, and large areas of exposed soil and ash in the aftermath, should a wildfire occur.

**8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places, or may cause loss or destruction of significant scientific, cultural, or historical resources.**

The Gold Project area has been inventoried for cultural resources. The file number for the cultural resource report is TNF2194/R2008051700023 (Slater). The inventory documents the presence of prehistoric and historic archaeological sites and several isolated features. Cultural resources would be managed according to provisions of the National Historic Preservation Act (NHPA) and implementing programmatic agreements (PAs). Adverse effects to cultural resources would be avoided by project design and site avoidance following standard forest practices that have been developed to implement the applicable NHPA provisions.

This action does not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places**.**

**9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.**

Biological Evaluations have been completed that include analyses of potential effects to federally listed (endangered, threatened) or proposed species. These reports determine that there are no effects from any of the alternatives to any federally listed or proposed species. There is no designated critical habitat in the Gold Project.

*Endangered Species:* There are no federally endangered species or their habitat identified within the project area.

*Threatened Species:* Habitat for the federally threatened California red-legged frog, Lahontan cutthroat trout, and the Valley elderberry longhorn beetle is absent from within the project area. The Biological Evaluation has concluded that the action alternatives would not affect the California red-legged frog, Lahontan cutthroat trout, or the Valley elderberry longhorn beetle.

*Proposed Species:* There are no proposed threatened or endangered plant or animal species that occur on the west side of the Tahoe National Forest.

**10. Whether the action threatens a violation of Federal, State, or local law or other requirements imposed for the protection of the environment.**

None of the action alternatives (Alternatives A. C or D) would not threaten a violation of Federal law or requirement imposed for the protection of the environment. All alternatives are fully consistent with the Endangered Species Act (see No. 9 above). This

EA is also in full compliance with the National Environmental Policy Act of 1969, and the California Public Resources Code (Section 5019). Alternatives A, C, and D are fully consistent with the with the Tahoe LMP as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (2004); and comply with the National Forest Management Act (NFMA) of 1976. NFMA requires all projects to be consistent with the following elements: (a) resource protection; (b) vegetation manipulation; (c) silvicultural practices; (d) even-aged management; (e) riparian areas; (f) soil and water; and (g) diversity.

**(a) Resource Protection –** The integrated design of the action alternatives, including the Standard Management Requirements listed in Chapter II of this document and detailed in the attached appendices provide for protection of forest resources, including riparian resources, terrestrial wildlife, aquatic and plant species and their habitat, cultural resources, air quality, soil productivity, and recreational and visual quality resources.

**(b) Vegetation manipulation –** The proposed thinning will enhance wildlife habitat and reduce stand density to a level that will improve the long-term health of the stands, and, in combination with the reduction of ground fuels, will reduce wildfire hazard and reduce potential loss of forest habitat from catastrophic wildfire.

**(c) Silvicultural practices –** No timber harvesting would occur on lands classified as not suited for timber production. Standard management requirements related to the use of mechanical harvesting equipment in thinning units are designed to protect soil productivity, riparian resources and water quality, fish and wildlife, recreation, and aesthetic resources.

**(d) Even-aged management –** No group selection harvest or other forms of even-aged management are proposed by any of the alternatives.

**(e) Riparian areas –** Sierra Nevada Forest Plan Amendment (SNFPA) guidelines would be applied to the treatment of Riparian Habitat Conservation Areas (RCAs) as appropriate to protect riparian resources. All the proposed treatments in RCAs are designed to minimize disturbance of riparian vegetation, soils, and other aquatic habitat elements. A riparian conservation objective (RCO) analysis and guidelines (Appendix C) has been developed for this project, consistent with SNFPA ROD standard and guideline 92 (SNFPA ROD, page 62).

**(f) Soil and water –** Working cooperatively with the California State Water Quality Control Board, the Forest Service developed pollution control measures, referred to as Best Management Practices (BMPs), that are applicable to National Forest System lands. The BMPs were evaluated by State Water Quality Control personnel as they were applied on site during management activities. After assessment of the monitoring data and completion of public workshops and hearings, the Forest Service's BMPs were certified by the State and approved by the Environmental Protection Agency (EPA) as the most effective means to control non-point source pollution.

The land treatment measures incorporated into Forest Service BMPs evolved through research and development measures, and have been monitored and modified over several decades with the expressed purpose of improving the measures and making them more effective. On site evaluations of the control measures by State regulatory agencies found the practices were effective in protecting beneficial uses and were certifiable for Forest Service application as their means to protect water quality. The Clean Water Act provided the initial test of effectiveness of the Forest Service non-point pollution control measures by requiring evaluation of the practices by regulatory agencies (State Board and EPA) and the certification and approval of the practices as the "BEST" measures for control.

BMPs are designed to accommodate site-specific conditions. They are tailor-made to account for the complexity and physical and biological variability of the natural environment. In the 1981 Management Agency Agreement between the State Water Resources Control Board and the Forest Service the State agreed that: "The practices and procedures set forth in the Forest Service document constitute sound water quality management and, as such, are the best management practices to be implemented for water quality protection and improvement on NFS lands." Further the Water Quality Control Plan for the Central Valley Regional Water Quality Control Board states "Implementation of the BMPs, in conjunction with monitoring and performance review requirements approved by the State and Regional Boards, is the primary method of meeting the Basin Plan's water quality objectives for the activities to which the BMPs apply."

The Regional Water Quality Control Board, Central Valley Region (CVRWQCB), on 28 April 2005, adopted Resolution No. R5-2005-0052 (Resolution) which provides for a conditional waiver of the requirement to file a report of waste discharge and obtain waste discharge requirements for timber harvest activities on U.S. Forest Service (USFS) lands within the Central Valley Region. The eligibility criteria for obtaining a conditional waiver are listed below.

To be eligible for coverage under this waiver category, the project has met the definition of timber harvest activities, and will comply with all of the applicable eligibility criteria and conditions.

Eligibility Criteria:

1. USFS has conducted a multi-disciplinary review of the timber harvest proposal, including review by watershed specialists, and has specified best management practices (BMPs), and additional control measures as needed, in order to assure compliance with applicable water quality control plans.

2. USFS has conducted a cumulative watershed effects (CWE) analysis and included specific measures needed to reduce the potential for CWEs in order to assure compliance with applicable water quality control plans.

3. USFS has allowed the public and other interested parties reasonable opportunity to comment on and/or challenge individual timber harvest proposals.

This project has complied with all the "Eligibility Criteria" and "General Conditions" specified in the Regional Board's Waiver.

**(g) Diversity –** Many of the standard management requirements and/or BMPs are designed to protect soil and water resources and therefore plant and animal habitats. These standard management requirements also contribute to the diversity of the project area by maintaining or enhancing these habitats. In addition, standard management requirements include measures to protect riparian vegetation, trees larger than 30" dbh, snags, down woody debris, unique and sensitive plants and fungi, threatened, sensitive and management indicator species and their habitats. Proposed thinning and ground fuel reduction treatments would improve forest health and contribute to reductions in predicted wild fire intensity. Reductions in fuel and increased tree growth as a result of thinning are expected to provide a more diverse landscape in the long term and therefore improve the long-term sustainability of forest habitat diversity. None of the action alternatives will change the seral stage or reduce habitat quality to a degree that would lead to a trend toward listing for any Forest Service Sensitive species, nor would they alter existing forest-wide trends in habitat for Management Indicator Species. (A seral stage map is a part of the project file and is available upon request from the Yuba River Ranger District). Implementing Forest Plan Standard and Guidelines and Management Requirements (Chapter II of this document) for this project would protect Forest Service Region 5 Sensitive species, Tahoe National Forest Management Indicator Species, and Watchlist Plants, and limit the spread of noxious weeds and invasive species. All of these protect diversity within the project area.

***R5 Forest Service Sensitive Species:***

Direct, indirect, and cumulative effects on fish, wildlife, and rare plants are discussed in detail in the following project documents, hereby incorporated by reference: (1) Biological Evaluation for Birds, Mammals, Amphibians, Reptiles, Fish, and Invertebrates, (2) Biological Evaluation for Plants and Fungi. These documents are located in the project file and available upon request from the Yuba River Ranger District office. These effects are summarized in this document in Chapter III.

The Biological Evaluations describe in detail these effects by species. The Biological Evaluation contains the following determination statements from implementing Alternatives A, C, and D:

- No effect to the following sensitive wildlife: bald eagle, greater sandhill crane, western red bat, northwestern pond turtle, foothill yellow-legged frog, mountain yellow-legged frog, northern leopard frog, Great Basin ramshorn snail, Lahontan Lake tui chub, hardhead.

- No effect to the following sensitive plants: *Lewisia kelloggii* ssp. *hutchisonii*.

- May affect, but is not likely to result in a trend toward federal listing or loss of viability for the following sensitive wildlife: California spotted owl, northern goshawk, great gray owl, willow flycatcher, Pacific fisher, American marten, Sierra Nevada red fox, California wolverine, pallid bat, and the Townsend's big-eared bat.

***Weed Risk Assessment:***

A weed risk assessment has determined that there is a low potential for increased rate of weed introduction and spread for the California State listed noxious weed species as a result of implementing the action alternatives. Implementation of Alternative A would reduce the amount of soil cover and canopy increasing the risk that weeds could become established in those areas. However, if equipment is coming to the project area from a weed infested area; it must be washed to reduce the risk of weed introduction. Currently, the number of weeds (and therefore the amount of weed seed) in the project area is low which reduces the probability that weeds could move into the areas disturbed during project implementation. Additional requirements include the use of weed free plant materials for erosion control work – if needed, which also reduces the risk of weed introduction into the project area.

***Management Indicator Species:***

A Management Indicator Species (MIS) Assessment has been completed for this project. This report is incorporated by reference and available from the District office upon request. The following MIS were selected for analysis for this project from the list of MIS identified in the Tahoe National Forest Land and Management Plan: fox sparrow, Pacific tree frog, mountain quail, California spotted owl, American marten, northern flying squirrel, and hairy woodpecker. The MIS analysis concluded that the effects of all action alternatives would not alter existing forest-wide trends of these MIS.

***Watchlist Plants:***

A watchlist plant and plant community report has been completed for this project. The project area contains an occurrence of the watchlist species *Drosera rotundifolia*. The project area also contains a fen, seeps, springs and aspen (watchlist plant communities). This watchlist species and the watchlist plant communities may be impacted by prescribed burning. Direct ignition of fuels will not occur within 100 feet of these plant communities. The aspen plan communities will benefit in the long term from removal of conifers.

## Agencies and Others Consulted

**The Scoping letter was mailed on 5/14/09 to the following:**

Stephen Benner/FIG

Lowell G. Robinson

Suzanne J. Kindle

Ken Wilde/
Sierra Pacific
Industries

Charles K. Smith

John J. Chambers

Darca Morgan/
Sierra Forest Legacy

Robert Eshleman

James J. Steinbarth

Nancy E. Proud

Oliver W. Wentz

James C. Johnston

John M. Strohm

James K. Christensen

Carol L. Manly

Kim Hemstalk

Kenneth F. Zib

Everett D. Butts

Jason White

Nora A. White

Bruce H. Forsythe

Peter F. Bryan

Arthur Bruce Morrison

SFP Minerals Corp.

Errol D. Burr

Martin A. Miller

Thomas G. Dejonghe

Jacqueline Bachels

Richard Siebrecht

Daniel Higgins

Joseph J. Hopper

Frederic R. Holbrook

State of California

Greenland Company

Patricia A. Rathbun

John W. Harris

Washoe Tribe of Nev
& Calif

Donald A. Kirby

Central 4 Wheel Drive,
INC

Carolyn F. Sterling

Marilyn Tierney

Bryan Devore

Glendel W. Atkinson

Richard T. Neubert

Sardine Lake Resort

Frederick L TTE Van
Overbeek

Louis E. Peshette

Packer Lake Lodge

SFP Minerals Corp

Eames, Rose F. Trust

Sierra Nevada Girl
Scout Council

Douglas Peterman

Michael A. Lorenzo

Joe D Smailes Forestry,
INC

Fred Dittrich

Leslie J. Dickey

Steven Everis Hayes

Thomas J. Edgman

Josh Finn

Sierra Buttes Association

Dennis E. Giuffre

Cindy Noble/
Sierra County Fire Safe & Watershed Council

Sierra Co. Land Trust

Tom Downing/
Sierra Pacific Industries

Janice Tippin

Shauneen Little

Dale Jenson

Barbara Foust

Billy VanMeter

Jason White

Rene Voss – Staff Attorney/
John Muir Project

**Scoping responses/requests were received from:**

Rene Voss and Dr. Chad Hanson of The John Muir Project

Josh Finn

Nathan Bamford of JW Bamford, Inc

Daniel Higgins

Everett Butts

Carolyn French Sterling

Fred Dittrich

Eric Sweet of Sierra Pacific Industries (SPI)

Tom Downing of SPI

Cindy Noble of Sierra County Fire Safe and Watershed Council

Richard Siebrecht

Darca Morgan of Sierra Forest Legacy

Joe Smailes

Louis & Nancy Peshette

## Additional Comments

### Documents Incorporated By Reference, and/or Available Upon Request, or Attached as Appendices

Project Maps (*Appendix A*)
Responses to Public Scoping Comments (*Appendix B*)
Best Management Practices/Watershed Data (*Appendix C)*
Cumulative Watershed Effects Analysis *(in Appendix C)*
Riparian Conservation Area Guidelines *(in Appendix C)*
Riparian Conservation Objectives Analysis *(in Appendix C)*
Vegetation Data (*Appendix D)*
References Cited (*Appendix F*)
Cultural Resources Report *(Administratively confidential)*
Wildland Fire/Fuels Report *(in Project File)*
Air Quality Report *(in Project File)*
Management Indicator Species (MIS) Assessment *(in Project File)*
Plant and Animal Biological Evaluations *(in Project File)*
References/Citations *(in Project File)*
Roads Analysis *(in Project File)*
Tahoe National Forest Sensitive Plant Standards and Guidelines *(Incorporated by Reference)*
Soils Report (in Project File)
Silvicultural Report *(in Project File)*
Watchlist Plant and Plant Community Report *(in Project File)*
Weed Risk Assessment *(in Project File)*